LONG-TERM STEWARDSHIP STUDY

DRAFT

Prepared to comply with the terms of a settlement agreement:
Natural Resources Defense Council, et al. v. Richardson, et al., Civ. No. 97-936 (SS) (D.D.C. Dec. 12, 1998).

Draft for Public Comment

October 2000

U.S. Department of Energy
Office of Environmental Management
Office of Long-Term Stewardship

Department of Energy
Washington, DC 20585

Letter from Dr. Carolyn Huntoon
Assistant Secretary for Environmental Management

The Department of Energy (DOE), including the National Nuclear Security Administration (NNSA), has prepared this *Draft Long-Term Stewardship Study* to comply with the terms of a settlement agreement between DOE, the Natural Resources Defense Council, and 38 other plaintiffs. The *Draft Study* describes and analyzes several significant national or cross-cutting issues associated with long-term stewardship. The Department identified these issues by conducting a public scoping process and considering information from a variety of other organizations that have considered long-term stewardship. Because the *Draft Study* is not a decision document, it does not attempt to describe how DOE intends to address these issues except where decisions already have been made. Where possible, the *Draft Study* identifies options for addressing these issues to promote information exchange and to inform the decision-making processes at the national level and at individual sites.

Many of the decisions framing DOE's long-term stewardship activities will be site-specific and depend on a variety of factors such as potential or future site missions, unique state, local, and Tribal requirements, and the ability of local communities and Tribal nations to maintain future land use controls. Many local issues can be discussed collectively on a programmatic basis. A better understanding of the challenges faced by DOE will allow individuals and organizations within and outside of the Department to make more informed decisions that shape future long-term stewardship activities, both nationally and at individual sites. The key challenges discussed in the *Draft Study* include:

- **Incorporating long-term stewardship considerations into cleanup decisions**. The term "cleanup" refers to the process of addressing contaminated land, facilities, and materials in accordance with applicable requirements. Cleanup does not imply that all hazards will be removed from the site. This function encompasses a wide range of activities, such as stabilizing contaminated soil; treating groundwater; decommissioning process buildings, nuclear reactors, chemical separations plants, and many other facilities; and exhuming sludge and buried drums of waste. The term "remediation" is often used synonymously with cleanup. Cleanup decisions have a significant influence on the "end state" (i.e., the physical condition reached when cleanup actions are complete) and on the resulting long-term stewardship requirements. Where a number of options are available to meet cleanup goals, more complete consideration of the long-term stewardship implications of each option would improve the Department's ability to plan for and implement long-term stewardship.

- **Ensuring the continued effectiveness of long-term stewardship if property ownership changes**. At some sites, DOE may transfer DOE owned or controlled property that requires long-term stewardship to other federal or non-federal entities. Under these circumstances, the Department will need to determine whether responsibility for long-term stewardship

should be transferred to the other entity in whole or in part; whether and how to impose management or use restrictions on the property; and how to oversee any restrictions or limits that are imposed. It may be difficult for DOE to enforce land use restrictions on land owned by someone else, particularly if ownership of the property continues to change hands.

- **Ensuring public access to information about residual hazards**. Successful implementation of long-term stewardship will depend on open public access to the appropriate information about the residual hazards at DOE sites; how they were generated; what the Department has done to reduce or mitigate the risks they pose; what ongoing long-term stewardship measures are required; and how long such measures are required. Continued protection of human health and the environment during long-term stewardship will depend upon public awareness and institutional openness. It will be difficult for the public to maintain land use restrictions without access to and understanding of information about residual hazards. However, public access to information needs to be balanced with legitimate security concerns.

- **Ensuring reliable and sufficient funding**. In the short term, annual Congressional appropriations provide an adequate mechanism for funding DOE's long-term stewardship activities. In the future, alternatives such as investment funds, mitigation funds, trust funds, commercial fees, or public-private partnerships may provide more stable sources of funding, although a variety of issues are associated with each funding alternative, including, in some cases, a lack of legislative authority to implement these options. Funding will be an important component of the overall long-term stewardship strategy at each site.

- **Maintaining continued partnerships with state, local, and Tribal governments**. States, local governments, and Tribal nations are likely to have some responsibility for certain long-term stewardship activities, including land use planning; developing and enforcing land use restrictions (e.g., zoning); and record-keeping (e.g., deed registration). Tribal nations also retain a unique political and legal status that requires federal trustee responsibility to protect the interests of Tribes. The affected communities surrounding DOE sites will need to be active participants in creating and maintaining institutions to transfer long-term stewardship information and responsibility over time.

- **Developing mechanisms to promote the sustainability of long-term stewardship**. Some of the residual hazards at DOE sites will almost certainly outlive any cleanup strategies that can be implemented using today's technologies. Unless advances in science and technology allow us to eliminate or otherwise reduce the hazards associated with long-lived substances, long-term stewardship responsibilities at most DOE sites will continue for many generations. Many aspects of human society, including cultural values, economic conditions, knowledge, science, and technology, will change over time. Therefore, mechanisms need to be developed to ensure that long-term stewardship survives, maintains focus, incorporates new science and technology, and re-evaluates requirements and strategies in light of these changes.

- **Building the concept of "pollution prevention" into the planning processes for new missions and facilities**. New missions at existing DOE facilities may generate long-lived wastes, wastes that have no clear path to disposal, surplus materials, or surplus facilities that

require long-term stewardship. The life-cycle environmental and cost impacts of mission operations, including those that occur during long-term stewardship, may be more easily mitigated if they are taken into account early in the planning process.

DOE has identified and discussed many of the issues associated with cleanup and the subsequent long-term stewardship requirements in two reports, and the Department has established an internet web site to better inform the public about cleanup and long-term stewardship issues.

- **The Accelerating Cleanup/Paths to Closure Reports**. Both the original report, published in June 1998, and the recent Status Report, published in March 2000, note that DOE cleanup efforts will not result in conditions that support unrestricted use at many sites.

- **The Background Document for this *Draft Study***. *From Cleanup to Stewardship, a Companion Report to* Accelerating Cleanup: Paths to Closure *and Background Information to Support the Scoping Process Required for the 1998 PEIS Settlement Study*, U.S. Department of Energy, Office of Environmental Management DOE/EM-0466, October 1999.

- **The Long-Term Stewardship Web Site**. The site is available at ***http://lts.apps.em.doe.gov***.

Furthermore, the Department has taken steps to improve planning for long-term stewardship.

- **DOE established the Office of Long term Stewardship**. The Office provides support and coordination among EM and other DOE offices. The Office has a major role in identifying policy and guidance needs; working with other DOE offices to develop and implement policies and communicate with national stakeholder groups; and coordinating with research and development organizations internal and external to DOE.

- **DOE formed the Long-term Stewardship Working Group**. The working group was established in 1998 to improve communication and coordination among DOE sites and organizations. The working group has provided guidance in preparing this *Draft Study* and is the focal point for DOE review of materials related to long-term stewardship (for example, draft Environmental Protection Agency guidance on CERCLA 5-year reviews).

- **Each DOE site is preparing a Project Baseline Summary (PBS) for long-term stewardship**. Guidance for preparing the EM annual budget directs each DOE site to prepare an independent PBS for long-term stewardship activities. At sites where this PBS is implemented, as cleanup projects are completed, budget requests, cost estimates, and performance metrics for the follow-on long-term stewardship activities will be shifted into this PBS.

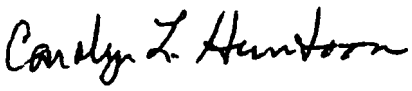
- **DOE sites are preparing site-specific long-term stewardship plans**. The Grand Junction Office (GJO) in Colorado is responsible for long-term stewardship at more than 25 sites where cleanup is complete. The Office currently requires development of a site-specific long-term stewardship plan before accepting long-term stewardship responsibilities for any site. Other DOE sites have prepared comparable plans such as Resource Management Plans.

- **DOE is preparing a Report to Congress on long-term stewardship**. The Report to Congress requested in the FY 2000 National Defense Authorization Act will identify sites or portions of sites where environmental restoration, waste disposal, and facility stabilization will be completed by 2006 without unrestricted land use and will describe the necessary management and long-term stewardship responsibilities for these areas, including cost, scope, and schedule. The Report to Congress will include the Department's most comprehensive estimate of long-term stewardship costs to date.

The Department of Energy recognizes that long-term stewardship is critical for ensuring continued protection of human health and the environment and is taking steps to develop policies, guidance, and procedures for planning and implementing long-term stewardship. This report, however, identifies a number of important issues and challenges that will need to be addressed. The success of long-term stewardship will depend upon a strong, open partnership between the Department, affected parties, and the general public. We welcome your comments; all comments should be submitted within 45 days of publication on the Notice of Availability in the *Federal Register*, as described in Section 1.2 of the *Draft Study*. With your help, we will continue to build a strong and sustainable long-term stewardship program.

Thank you again for your continued work on issues related to this *Draft Long-Term Stewardship Study*.

Sincerely,



Carolyn L. Huntoon
Assistant Secretary
For Environmental Management

Table of Contents

List of Exhibits

Chapter 1: Introduction

During World War II and the Cold War, the federal government developed the "nuclear weapons complex," a vast network of industrial facilities for the research, production, and testing of nuclear weapons. The production of tens of thousands of nuclear weapons, and the testing of more than a thousand, left an enormous legacy of radioactive and chemical waste, contamination, and hazardous facilities and materials. During the past decade, the U.S. Department of Energy (DOE) Environmental Management (EM) program has made significant progress in addressing this environmental legacy, and has reduced the risks and costs associated with maintaining safe conditions across the DOE complex. Based on existing plans and agreements with regulators and affected parties,[1] EM program cleanups will leave behind residual levels of radioactivity (e.g., buried waste) and other residual hazards at most sites.[2] The challenge facing DOE is how to ensure continued protection of human health and the environment after the cleanup projects are complete. Exhibit 1-1 provides an overview of recent documents that discuss DOE's long-term stewardship mission.

What is Long-term Stewardship?

There are many different perspectives on the definition and scope of long-term stewardship. The *Draft Study* uses the following definition from the 1998 Settlement Agreement:

> "the physical controls, institutions, information and other mechanisms needed to ensure protection of people and the environment at sites where DOE has completed or plans to complete 'cleanup' (e.g., landfill closures, remedial actions, removal actions, and facility stabilization). This concept of long-term stewardship includes, *inter alia*, land-use controls, monitoring, maintenance, and information management."

The *Draft Study* also considers issues related to several sites where cleanup was completed by parties other than DOE, but where DOE has been mandated to conduct long-term stewardship.

DOE, including the National Nuclear Security Administration (NNSA), has prepared this *Draft Long-Term Stewardship Study* to comply with the terms of a settlement agreement between DOE, the Natural Resources Defense Council, and 38 other plaintiffs.[3] The specific language pertaining to the *Long-Term Stewardship Study* is summarized in Exhibit 1-2 and presented in its entirety in Appendix A. In preparing this *Draft Study*, DOE conducted a public scoping process to obtain input on what issues the Department should address. The *Draft Study* considers information provided by other organizations that have considered long-term stewardship, including stakeholder groups at DOE sites, the Environmental Management Advisory Board, the State and Tribal Government Working Group, the National Research Council, the Energy Communities Alliance, the Environmental Law Institute, and Resources for the Future. Appendix B provides a summary of the scoping comments received and the issues identified during the scoping process.

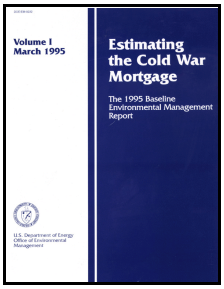
[1] The term "affected parties" refers to individuals and communities living in the vicinity of DOE sites and includes Tribal nations, state governments, local governments, and private citizens.

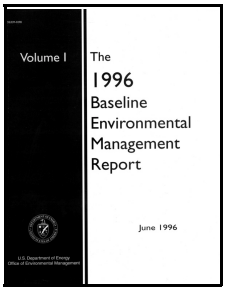
[2] *Status Report on Paths to Closure*. U.S. Department of Energy, Office of Environmental Management. DOE/EM-0526, March 2000.

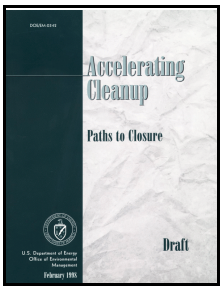
[3] *Natural Resources Defense Council, et al. v. Richardson, et al.*, Civ. No. 97-936 (SS) (D.D.C. Dec. 12, 1998).

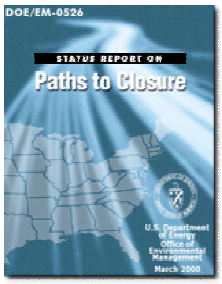
Exhibit 1-1. Recent Documents Related to the Concept of Long-term Stewardship at DOE Sites

The 1995 and 1996 Baseline Environmental Management Reports provided the first comprehensive scope and cost estimates for the cleanup of the nuclear weapons complex. The reports clearly identified that most of the contaminated areas at DOE sites would not be cleaned up to "green field" or unrestricted use and that almost all DOE sites would require long-term surveillance and monitoring far into the future.



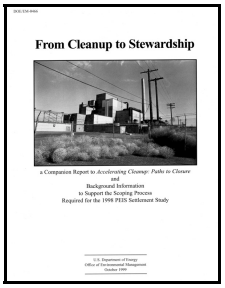






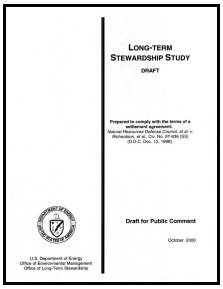
The **Paths to Closure Reports** reorganized the scope associated with the schedule and cost in the Baseline reports into formal projects. The 1998 report articulated the vision of reducing the overall program cost by accelerating cleanup, completing projects, and closing sites, with a goal of achieving as much as possible by 2006. The 2000 Status Report updates life-cycle cost and schedule estimates. The Department addressed the need for long-term stewardship in these national summaries, but in response to significant public comment, a more complete consideration was deferred to a companion document.

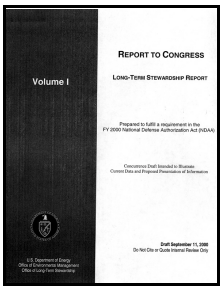
From Cleanup to Stewardship was published as a companion document to the 1998 Paths to Closure report and began to examine national policy issues, challenges, and barriers associated with the transition from cleanup to long-term stewardship.



From Cleanup to Stewardship also provides a summary of the nature and extent of DOE's long-term stewardship responsibilities for soils, facilities, groundwater, surface water, and engineered units.

The Draft Long-Term Stewardship Study describes and analyzes the national issues associated with long-term stewardship in greater detail. Because it is not a NEPA or decision document, the *Draft Study* does not attempt to describe how DOE intends to address these issues except where decisions already have been made. Where possible, it identifies options for addressing issues in order to promote information exchange and to inform the decision-making processes at the national level and individual sites. The *Draft Study* does not address issues related to specific sites or national security issues such as stewardship of nuclear weapons and special nuclear materials.





The Report to Congress on Long-Term Stewardship identifies sites or portions of sites where environmental restoration, waste disposal, and facility stabilization will be completed by 2006 but land use would be restricted. The *Report to Congress* describes the necessary management and long-term stewardship responsibilities for these areas, including cost, scope, and schedule, at a much finer level of detail than in previous reports. The Report to Congress is expected to be released in December, 2000.

Copies of these documents can be obtained from the Center for Environmental Management Information (1-800-736-3282) or from the Internet at *http://lts.apps.em.doe.gov*

Exhibit 1-2. Legal Basis for the *Draft Long-Term Stewardship Study*

The Department is preparing this study pursuant to the terms of the Settlement Agreement between DOE, the Natural Resources Defense Council, and 38 other plaintiffs (see Appendix A). According to the Settlement Agreement:

> *"While DOE's study on long-term stewardship will not be a NEPA document or its functional equivalent, DOE will, nevertheless, follow the procedures set forth in the regulations of the President's Council on Environmental Quality (CEQ) for public scoping, 40 C.F.R. § 1501.7(a)(1)-(2)...."*

DOE has followed the President's Council on Environmental Quality procedures for public scoping, 40 CFR Part 1501.7(a)(1)-(2), in preparing the *Draft Study*. The scoping process provided DOE with input about the topics and issues that the commenters believed should be included in the study. DOE considered all relevant comments and suggestions in developing the scope of the study.

As specified in the Settlement Agreement, the public review process for the *Draft Study* will follow:

> *"the procedures set forth in DOE's NEPA regulations for public review, of environmental impact statements, 10 C.F.R. § 1021.313, except that (a)...DOE (not EPA) will publish a Notice of Availability in the Federal Register, as set forth in 10 C.F.R. § 1021.313(a); and (b) DOE will not include any Statement of Findings as set forth in 10 C.F.R. § 1021.313(c)."*

This public review process includes a public comment period and a public hearing. It is intended to allow comprehensive public comment on the *Draft Study*. DOE will use input from the public to complete the final study. A Notice of Availability has been issued in the Federal Register describing the public review process for the *Draft Study*. A public comment period will extend for 45 days after publication of the Notice of Availability. DOE will prepare a final study, including a comment response summary document, for release to the public.

The full text of the PEIS Settlement Agreement can be found at ***http://lts.apps.em.doe.gov***

1.1 Organization of the *Draft Study*

- Chapter 2 describes the complexity of long-term stewardship and notes where critical issues are discussed in the *Draft Study*.

- Chapter 3 describes the relationship between cleanup decisions and long-term stewardship obligations.

- Chapter 4 describes DOE's long-term stewardship activities and how long-term stewardship is being planned and implemented at DOE sites.

- Chapters 5 through 9 provide more detailed discussions of several key issues that have been identified by DOE and during the public scoping process:

  – Managing residual site hazards (Chapter 5);
  – Managing land and real property (Chapter 6);
  – Information management (Chapter 7);
  – Funding and financial management (Chapter 8); and
  – Environmental and socioeconomic issues, including public involvement (Chapter 9).

- Chapter 10 identifies and discusses some of the important challenges associated with maintaining the sustainability of long-term stewardship over multiple generations.

Limitations of the *Draft Study*

The *Draft Study* describes and analyzes several significant national or cross-cutting issues associated with long-term stewardship and, where possible, options for addressing these issues. However, the *Study* is not a decision document, and it does not attempt to select among any options discussed. The principal purposes of the *Draft Study* are to promote information exchange and to inform the decision-making processes at the national level and at individual sites.

1.2 How to Provide Public Comments

The Department encourages members of the public to provide comments on the issues and findings raised in this *Draft Study*. Comments may be submitted in the following manner:

- By electronic submission to ***http://lts.apps.em.doe.gov***
- By mail to Steven Livingstone, Project Manager, U.S. Department of Energy, P.O. Box 45079, Washington, D.C. 20026-5079.
- By fax at 202-863-7036.
- By email to Steven Livingstone (***Steven.Livingstone@em.doe.gov***).
- At the public hearing to be held on Thursday, November 30, 2000 from 9:00AM - 1:00PM at:
  U.S. Department of Energy
  Forrestal Building
  1000 Independence Avenue SW
  Washington, D.C.
  Room 1E245

All comments should be submitted or postmarked by December 15, 2000.

Chapter 2: Long-term Stewardship is Complex

Many of the decisions framing DOE's long-term stewardship activities will be site-specific and depend on a variety of factors such as potential or future site missions; unique state and local requirements and Tribal agreements; and the willingness and ability of affected parties to maintain future land use controls. Many local issues can be discussed collectively in general terms. A better understanding of the challenges faced by DOE will allow individuals and organizations within and outside of the Department to make more informed decisions that shape future long-term stewardship activities, both nationally and at individual sites.

APPLICABLE SCOPING COMMENTS AND ISSUES

Each subsequent chapter will include a box that highlights the public comments received by DOE during the scoping process for the *Draft Study* that apply to the issues being discussed in the chapter. The box also will identify which of the 27 issues identified during the scoping process are addressed in that chapter. Appendix B summarizes all of the scoping comments, lists the 27 issues, and identifies where the comments and issues are addressed in the *Draft Study*.

DOE is currently conducting long-term stewardship at many sites across the country, either as the sole activity at the site (e.g., monitoring a uranium mill tailings disposal cell), or for some portion of a site where remediation has been complete (e.g., performing quarterly groundwater monitoring for a pump and treat system). At other sites, the decision-making processes that will ultimately determine long-term stewardship obligations are just now underway. The questions that remain, however, are numerous, complex, and profound. What type of framework will guide long-term stewardship activities? Who will ultimately be responsible for managing long-term stewardship and ensuring its success? How reliably will DOE and perhaps others carry out long-term stewardship activities at sites? What will happen if long-term stewardship fails? What are the implications on long-term stewardship of cleanup decisions that are made today? To be able to begin to address these and other questions, it is important that DOE and all affected parties fully understand the challenges ahead.

This chapter provides an overview of several issues that were identified during the research and public scoping for the *Draft Study*. These issues will shape DOE's long-term stewardship activities and also highlight the complex nature of those activities. The chapter also identifies where these issues are discussed in the *Draft Study*.

2.1 Today's Cleanup Decisions Have Profound Implications for the Future

Decision-makers should take into account the cost and difficulty of long-term stewardship before selecting a cleanup[4] option. Cleanup decisions affect the "end state," or the physical condition

[4]The term "cleanup" refers to the process of addressing contaminated land, facilities, and materials in accordance with applicable requirements. Cleanup does not imply that all hazards will be removed from the site. This function encompasses a wide range of activities, such as stabilizing contaminated soil; treating groundwater; decommissioning process buildings, nuclear reactors, chemical separations plants, and many other facilities; and exhuming sludge and buried drums of waste. The term "remediation" is often used synonymously with cleanup.

reached when cleanup actions are complete (including residual hazards). The end state, in turn, essentially determines how the residual hazards will need to be managed for the long term, and thus establishes implicit or explicit long-term stewardship obligations. The end states and resulting long-term stewardship requirements, in turn, are the basis for identifying needs and opportunities for new science and technology to improve protectiveness and/or lower costs. Because cleanup decisions are still being made at many sites, all cleanup alternatives should include long-term stewardship activities to ensure that scope, schedule, and cost issues are adequately addressed.

At many sites, a number of options may be available to meet the cleanup goals established for a particular environmental problem. For example, options available for contaminated soil or groundwater may include removal, in-situ treatment, containment, or monitored natural attenuation. Each of these options has implications for long-term stewardship. Removal or treatment to achieve unrestricted use would result in no need for long-term stewardship beyond routine record-keeping at that site. However, when radioactive or other hazardous materials are removed from one site and relocated to another, the requirements for long-term stewardship are merely transferred, not eliminated. The use of caps, barriers, or pumping to prevent additional migration of contaminants would result in a need to monitor, maintain, and repair or replace the containment systems. Containment and monitored natural attenuation would likely require the maintenance of land use controls to retain protectiveness. For long-term stewardship to be successful, all controls used to contain or isolate residual hazards must remain effective until the residual hazards have diminished to the point that unrestricted use is allowed.

Chapter 3, *The Relationship Between Cleanup, End State, and Long-term Stewardship*, describes the relationship between cleanup decisions and long-term stewardship requirements. Chapter 5, *Hazard Management*, discusses issues involved in managing residual hazards following cleanup.

2.2 Long-term Stewardship Activities are Subject to a Variety of Legal Requirements

More than 100 Executive Orders, statutes, regulations, compliance agreements, and treaty obligations may affect long-term stewardship activities. The existing framework for DOE mission activities includes the concept of long-term stewardship. Each of these requirements address facets of long-term stewardship, but there currently is no single enforceable requirement that clearly and cohesively directs the planning and implementation of long-term stewardship.

Chapter 4, *DOE's Long-term Stewardship Activities*, describes the current regulatory framework and how DOE is currently implementing long-term stewardship at its sites. Appendix D summarizes major statutes, regulations, and Executive Orders that require DOE to conduct miscellaneous long-term stewardship activities.

2.3 New Site Missions and Facilities May Affect Long-term Stewardship Requirements

New DOE missions and facilities may have long-term stewardship implications. Mission operations may generate long-lived wastes or surplus materials that may require long-term stewardship. After operations are completed, facilities may be entombed in place or decontaminated and decommissioned in such a manner that results in residual hazards requiring long-term stewardship. New or expanded site missions and associated facilities may eventually

lead to additional long-term stewardship challenges. The life-cycle environmental and cost impacts of mission operations, including those that occur during long-term stewardship, may be more easily mitigated if they are taken into account early in the planning process.

Chapter 6 of this report, *Managing Real Property*, presents a full discussion of the current planning requirements that exist at DOE sites.

2.4 Land Transfers Challenge Implementation of Long-term Stewardship

At the conclusion of cleanup activities, lands owned or controlled by DOE are likely to follow one of four disposition paths:

- Retention indefinitely as federal lands managed by DOE or another federal agency. This is most likely where lands are needed for ongoing missions, federal and Tribal governments want to preserve natural resources or cultural resources, or risks associated with residual hazards are relatively high.

- Transfer to the Secretary of the Interior, under the direct management of the Bureau of Indian Affairs, to be held in federal trust for Native American Tribes. This is most likely where affected parties want to use lands for specific uses (e.g., treaty reserved use) and risks associated with residual hazards are consistent with these anticipated uses.

- Transfer to non-federal government ownership and release for restricted or specific use. This is most likely where affected parties want to use lands for economic redevelopment or other specific uses and risks associated with residual hazards are consistent with these anticipated uses.

- Transfer to non-federal ownership and release for unrestricted use. This is most likely for lands that are currently uncontaminated or where cleanup has been able to reduce risks to levels appropriate for unrestricted use.

The transfer of property that requires long-term stewardship to other entities presents challenges to long-term stewardship implementation. The federal government has ultimate fiduciary responsibility for long-term stewardship at DOE sites. DOE will need to determine whether to retain active control of long-term stewardship activities, whether and how to impose management or use restrictions on the property, how to oversee any restrictions or limits that are imposed, and how such activities will be funded. It may be difficult for DOE, other agencies, or regulators to enforce restrictions on land owned by someone else, particularly if ownership continues to change hands.

Chapter 6, *Managing Real Property*, presents a discussion of managing real property, the implications of property transfers on long-term stewardship requirements, and the difficulties that property transfers may pose for long-term stewardship.

2.5 The Public Needs Open Access to Information about Residual Hazards at DOE Sites

Successful implementation of long-term stewardship will be aided by open public access to the specific information about the residual hazards at DOE sites, including how they were generated, what DOE has done to reduce or mitigate the risks they pose, what ongoing measures are required, and, to the extent possible, how long such measures are required. Continued protection of human health and the environment will depend on public awareness and institutional openness. For example, it may be difficult for people to accept restrictions on land and resource use unless they fully understand why such restrictions are necessary (and conversely what activities can be safely conducted on the land). This is a challenge in the near term, and because long-term stewardship obligations will be passed on from generation to generation, it becomes one of the most critical challenges to sustainability.

Chapter 7, *Information Management*, describes the types of information practices that will be necessary to support long-term stewardship and identifies how DOE has begun to develop such practices.

2.6 Reliable Funding is a Significant Concern

One of the biggest stakeholder concerns is the source and nature of sustained funding for long-term stewardship. Long-term stewardship activities at DOE sites are currently funded largely through annual Congressional appropriations. In the short term, this process is adequate. In the future, however, funding shortfalls could result from competing national priorities or unanticipated one-time expenditures (e.g., to repair a waste vault failure). Alternatives such as investment funds, mitigation funds, trust funds, commercial fees, and public-private partnerships may provide more stable sources of funding. A variety of issues are associated with each funding alternative, including in some cases the lack of clear legislative authority to implement the alternative.

Chapter 8, *Funding and Financial Management*, provides further detail on the challenges to estimating what the costs for implementing stewardship will be and the types of funding mechanisms that could be used for long-term stewardship.

2.7 Continued Partnerships with State, Local, and Tribal Governments is Essential

Depending on specific site circumstances, successful implementation of long-term stewardship may require significant participation from states, local communities, and Tribal nations, which have a unique legal and political relationship with the United States government. Entities other than DOE are likely to have some responsibility for certain long-term stewardship activities. For example, local and Tribal governments have traditionally conducted and enforced land use planning, certain land use restrictions (e.g., zoning) and certain types of record-keeping (e.g., deed registration). Local communities and Tribal governments also may need to be active participants in creating and maintaining institutions to transfer long-term stewardship information and responsibility from generation to generation.

Affected parties may have secondary long-term stewardship goals for a site. In some instances, secondary goals may conflict with one another. Tribal goals often differ from those of local

governments. A secondary goal of maintaining a site as open space for cultural resource protection or aesthetic reasons might be in conflict with a secondary goal to develop the site to enhance the local economy. It is essential that existing partnerships between DOE and affected parties continue to be maintained during long-term stewardship.

Chapter 9, *Natural Resources, Cultural Resources, Socioeconomic Issues, and Environmental Justice*, identifies many of the concerns and competing priorities that may need to be balanced during long-term stewardship. The strong need for continued partnerships is also noted in several other chapters.

2.8 Long-term Stewardship Responsibilities Will Pass from Generation to Generation

How long will long-term stewardship be required? There is no precise answer to this question, but many of the residual hazards at DOE sites are likely to persist for many generations:

- Chromium, lead, and other elemental metals do not degrade in the environment and may pose threats through bioaccumulation in the food chain.

- Many organic chemicals, such as trichloroethylene, are relatively stable in the environment and may persist for hundreds of years. Other organic chemicals (e.g., benzene) may degrade in the environment over periods of decades. Organic chemicals may be difficult to remove from contaminated media and thus may pose threats for continued migration.

- Entombed facilities, building foundations, and buried infrastructure left in place may present physical hazards that will persist far into the future.

- Many of the radionuclides present at DOE sites have half-lives[5] measuring hundreds, thousands, and even millions of years. While half-life *per se* does not necessarily indicate either the hazards posed by the material or the length of time that long-term stewardship will be required, it is clear that many of the long-lived residual hazards at DOE sites have the potential to persist far into the future.

Some of the residual hazards at DOE sites will almost certainly outlive any cleanup strategies that can be implemented using today's technologies (e.g., disposal in landfills). Therefore, unless advances in science and technology allow us to eliminate or otherwise reduce the hazards associated with these long-lived substances, long-term stewardship responsibilities will pass from generation to generation. However, as experience has shown, there are challenges inherent in such intergenerational transfer.

The threats posed by residual hazards, the ability to reduce or eliminate these threats, and the economic value placed on residual materials and contaminated areas are likely to change over time. However, the obligation to conduct long-term stewardship to protect human health and the environment will remain. Therefore, the approaches and strategies developed for long-term

[5]The half-life of a radionuclide is a physical characteristic specific to that radionuclide. A half-life is the time required for a given amount of radioactive material to decay to half that amount. Half-lives of radionuclides vary from a fraction of a second to billions of years.

stewardship must also evolve over time. Residual hazards and strategies for managing these hazards should be re-evaluated periodically to take into account new science and technology. Periodic reviews also will allow stewards to evaluate current and future technologies for which long-term effectiveness has not been demonstrated.

Chapter 10, *Sustainability of Long-term Stewardship*, discusses these inter-generational issues in detail, including the importance of integrating science and technology effectively into long-term stewardship activities. Chapter 4, *DOE's Long-term Stewardship Activities*, also discusses science and technology development efforts within the Department.

Chapter 3: The Relationship Between Cleanup, End State, and Long-term Stewardship

Many of the specific long-term stewardship requirements at a site will follow directly from the types of cleanup actions being performed today. Decisions such as what to do with contaminated soils or facilities, and the subsequent cleanup actions taken to implement these decisions, will result in a specific *end state* for the site.[6] The cleanup strategy implemented at a site and the resulting end state achieved are closely related to the potential future use of land and water resources and long-term stewardship requirements. In some cases, intended future uses will determine the end state conditions to be achieved during cleanup. In other cases, technical, economic, and worker safety considerations may limit the end state conditions that can be achieved, and thus may limit future uses. Specific long-term stewardship requirements will depend directly on the cleanup strategy implemented, end state achieved, and desired future uses.

This chapter describes DOE's efforts to integrate consideration of long-term stewardship issues into cleanup decisions, identifies several challenges facing the Department, and identifies several criteria for evaluating the long-term stewardship implications of cleanup decisions and end states.

APPLICABLE SCOPING COMMENTS
(see Exhibit 2 in Appendix B)

- DOE should not use long-term stewardship as a substitute for cleanup; leaving contamination in place should not be a priority cleanup strategy (13, 14)
- Long-term stewardship should be instituted only after cleanup to remove the maximum amount of contamination has been undertaken (13)
- DOE's long-term stewardship obligations will be higher at a given site if on-site waste treatment and disposal facilities are used instead of off-site facilities (15)
- DOE should develop methods for accurately reflecting long-term stewardship commitments in decision documents or should identify any uncertainties related to these commitments (STGWG)
- Each remedial alternative considered should be evaluated with respect to the types of institutional controls required and how they will be implemented (1, STGWG)
- DOE should use life-cycle accounting to assess the complete costs, present and future, associated with cleanup decisions (1, 4)
- DOE needs to identify portions of sites that can be cleaned up to unrestricted use and portions that can never be cleaned up completely with available technologies (18)

APPLICABLE ISSUE
(see Exhibit 3 in Appendix B)

1. *Relationship of "Cleanup" Decision Process to Long-term Stewardship Needs*

3.1 Cleanup and Long-term Stewardship

During cleanup, it is important to consider long-term stewardship issues and obligations explicitly when examining remedial alternatives and implementing a final remedy.[7] Affected parties need to understand how the cleanup actions selected during remedy selection and

[6]The "end state" of a site or portion of a site is the physical condition reached when cleanup actions are complete. Key components for long-term stewardship include the nature and extent of residual contamination; the location and condition of stored or disposed materials; the location, type and condition of all engineered control and monitoring systems, and the threats posed to affected parties.

[7]*Planning and Implementing RCRA/CERCLA Closure and Post-Closure Care When Wastes Remain Onsite*. U.S. Department of Energy, Office of Environmental Policy and Assistance, RCRA/CERCLA Information Brief. DOE/EH-413-9910, October 1999.

implementation processes will be implemented over time. To the extent they are willing to have a role in implementing certain aspects of long-term stewardship (e.g., managing and disseminating monitoring data, maintaining and enforcing groundwater use restrictions), affected parties also need to understand the future resource obligations they may incur as a result of this role. Affected parties also need to determine the value of long-term stewardship activities in terms of how effectively they may prevent a larger scale problem from impacting their communities in the future.

The Atomic Energy Act (AEA) directs DOE to manage radioactive materials in a manner consistent with the protection of health and safety of the public. The AEA authorizes DOE to establish standards to protect human health and the environment from activities under DOE jurisdiction.[8] The Resource Conservation and Recovery Act (RCRA) requires DOE and all other federal agencies to comply with all federal, state, and local laws and regulations concerning solid and hazardous waste (including mixed waste). As a consequence, DOE relies upon regulations and procedures developed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), RCRA, the Uranium Mill Tailings Radiation Control Act (UMTRCA), similar state regulations, site-specific agreements, and in some cases Nuclear Regulatory Commission (NRC) regulations to carry out cleanup actions.[9] The cleanup authorities under the AEA, CERCLA, RCRA, and UMTRCA set the initial parameters for engineered and institutional controls and long-term care of sites as the necessary follow-on tasks to cleanup actions that cannot achieve unrestricted use.

Future Site Transfers May Increase DOE's Long-term Stewardship Responsibilities

At most sites, long-term stewardship requirements stem from the decisions made jointly by DOE, EPA, and state and Tribal governments, with input from the public during the cleanup process. At other sites where cleanup is not completed by DOE, Congress has authorized the transfer of long-term stewardship responsibility to DOE after cleanup is complete.

- Title II of the Uranium Mill Tailings Radiation Control Act (UMTRCA) requires the transfer of uranium processing sites that were privately owned when the Act was passed to the host state or the federal government. If the state declines, then DOE becomes the site steward; to date no states have expressed an interest in permanent custody and long-term stewardship.
- Section 151(b) of the Nuclear Waste Policy Act allows the transfer of certain NRC licensed, privately owned sites with low-level radioactive waste (and the land on which such waste is disposed of) to be transferred to DOE for long-term custody and care; but only if DOE accepts these sites.

The processes for determining cleanup decisions involve (1) evaluating the site conditions (e.g., contaminants of concern and concentration levels, real or potential risk, future use); and (2) developing remediation goals consistent with a set of threshold (or performance) criteria and balancing criteria, identified in both the CERCLA National

[8]For example DOE has developed Orders such as Order 5400.1 *General Environmental Protection Program*, Order 5400.5 *Radiation Protection of the Public and the Environment*, and Order 435.1 *Radioactive Waste Management* in order to establish and maintain conditions that are protective of human health and the environment. DOE Orders are internal requirements that are not enforceable by external parties (e.g., regulators).

[9]Activities under the jurisdiction of DOE generally are exempt from licensing requirements of the Nuclear Regulatory Commission (NRC), with limited exceptions. For example, DOE conducts cleanup actions and long-term stewardship at uranium mill tailings sites under site licenses issued by the NRC in accordance with requirements in 10 CFR Parts 40.27 and 40.28; and DOE conducts long-term stewardship of decommissioned nuclear reactor facilities at Hallam, Nebraska and Piqua, Ohio under NRC site licenses.

Contingency Plan and in RCRA guidance documents. These criteria include evaluating long-term effectiveness and permanence of the alternative, anticipated future use, and the degree of certainty that the alternative will prove successful (Exhibit 3-1).[10] Requirements of cleanup decisions under RCRA typically extend up to 30 years beyond completion of cleanup, with provisions to extend monitoring and maintenance activities beyond that period if necessary.

Exhibit 3-1. CERCLA Criteria for Evaluating and Selecting Remedies*

Protection of human health and the environment. The ability of each alternative to provide protection is assessed. The assessment draws on the baseline risk assessment and the evaluations of other criteria, especially the long- and short-term effectiveness evaluations.

Compliance with Applicable and Relevant and Appropriate Requirements (ARARs). Each alternative must comply with chemical-specific, action-specific and location-specific ARARs. If an alternative cannot achieve compliance, justification for a waiver of the ARAR must be developed.

Long-term effectiveness. This evaluation assesses the residual risk posed by the site following the remedial action. This assessment also considers the reliability and adequacy of the remedial action in providing a long-term solution to the contamination at the site.

Reduction of toxicity, mobility, and volume of contamination. This involves assessment of the treatment process, the materials being treated, the effectiveness of the treatment and the quantity of contaminated material remaining following the remedial action.

Short-term effectiveness. This addresses the risks posed by each remedial alternative during construction and implementation, up to the time the remedial action objectives are achieved. Each alternative is evaluated to determine the degree of protection afforded the surrounding community during the remedial action, the degree of the risk posed to workers during implementation, the adverse environmental impacts arising from construction and implementation, and the time required to achieve the remedial action objectives.

Implementability. This assesses both the technical and administrative feasibility of implementing each remedial alternative. Included in this assessment are (1) consideration of the availability of the necessary resources to construct and implement the remedy, (2) an assessment of the reliability of the technology, and (3) the ease of undertaking other remedial actions at the site once the alternative is implement. Another aspect of this assessment is the determination of the requirements for interaction with other federal, state or local agencies. For example, this assessment may require determining any necessary permits for offsite activities.

Cost-effectiveness. This evaluation includes direct and indirect capital costs, as well as the operating and maintenance costs, associated with the remedial action. This process should also consider the costs of any long-term liability associated with implementing the remedy.

State and community acceptance. After the state and stakeholders have had an opportunity to review the proposed remedial and corrective action alternatives and supporting documentation, their comments can lead to modification of DOE's preferred alternative.

*RCRA requirements for remedy selection are similar

Cleanup standards and long-term stewardship requirements for UMTRCA sites are established directly by UMTRCA, NRC regulations, and EPA regulations. A long-term surveillance and maintenance plan is required for each UMTRCA site, including the monitoring and maintenance

[10] *Development of Remediation Goals under CERCLA*, U.S. Department of Energy, Office of Environmental Policy and Assistance, CERCLA Information Brief. DOE/EH-413/9711, August 1997; *RCRA Closure and Post-Closure Plans*, U.S. Department of Energy, Office of Environmental Guidance, RCRA Information Brief. DOE/EH-231-009/1291, December 1991.

of engineered controls and provisions for emergency measures required to protect public health and safety. Under the AEA, once site cleanups are completed,[11] the NRC will license the long-term maintenance and monitoring of UMTRCA sites in perpetuity. According to NRC regulations,[12] there is no termination of the general license issued by the NRC for custody and long-term care of residual radioactive material disposal sites.

The remedy selection process essentially determines how any residual hazards at a site will be managed for the long term and thus establishes implicit or explicit long-term stewardship requirements. For example, a remedy that incorporates an assumption about anticipated future land use establishes the long-term stewardship requirement to ensure that actual land uses remain consistent with this assumption. Similarly, a remedy that involves construction of a cap over a landfill establishes the long-term stewardship requirement to perform surveillance and maintenance of the cap and perform monitoring around and below the landfill. Similar long-term stewardship obligations apply to private-sector and municipal landfills.

With respect to remedial actions conducted at DOE sites, if complete treatment or removal of the source(s) and resulting contaminated media is technically and economically feasible, the affected area should be suitable for unrestricted use (unless the area is needed for security or safety reasons). In these cases, where residual hazards have been eliminated, information management (e.g., routine record-keeping) will be the only long-term stewardship activities that will be required.

DOE typically conducts cleanups to achieve levels of residual hazards that are consistent with site land use plans. At sites where it is not technically or economically feasible to remediate to levels consistent with unrestricted use, CERCLA, RCRA, UMTRCA, and other statutes require the use of long-term controls and/or operations as part of the remedy. A remedy consistent with an industrial land use plan would thus require appropriate institutional controls to protect worker health and safety. RCRA, CERCLA, and UMTRCA also require the monitoring of remedies to ensure their efficacy. The implementation of monitoring and institutional controls becomes a major part of long-term stewardship (see Chapter 5).

Closure of Beatty Low-Level Radioactive Waste Disposal Site

On December 30, 1997, the State of Nevada assumed long-term stewardship responsibility for a commercial, low-level waste disposal site in Beatty, NV. The disposal site was established in 1962 as a commercial site that was located on state property. The site closed in 1992, and the owner conducted closure and post-closure activities pursuant to the requirements in 10 CFR Part 61. The site was always state property, and the terms of the original site license called for the State of Nevada to accept permanent custody of the disposal site after closure. Because the license was agreed upon prior to the promulgation of 10 CFR Part 61, only some of the requirements of the regulation are applicable (for example, financial assurance was not applicable). The Beatty site was the first low-level radioactive commercial waste disposal site to complete all closure activities. It is not clear whether DOE will be responsible for long-term stewardship pursuant to section 151(b) of the Nuclear Waste Policy Act. DOE has the authority (but not the obligation) to take responsibility for long-term stewardship of certain closed, privately owned sites with low-level radioactive contamination.

Sources: *Beatty facility closure complete, state takes over*. Nuclear News, February 1998, p. 67; Telephone conversation with the State of Nevada Health Division, June 26, 2000.

[11]DOE is responsible for the cleanup of Title I sites; the licensee is responsible for the cleanup of Title II sites.
[12]10 CFR Part 40.27(b) [Title I] and 10 CFR Part 40.28(b) [Title II]

The processes for evaluating remedial alternatives and selecting, designing, and implementing remedies should include consideration of the full life-cycle of each alternative, including any needed long-term stewardship activities associated with the remedial alternatives. DOE has developed initial guidance for evaluating long-term stewardship requirements during these processes,[13] and NRC has developed specific regulations for long-term stewardship of UMTRCA sites (10 CFR Part 40 Appendix A). However, certain challenges remain, particularly for RCRA/CERCLA cleanup actions. In particular, it is not clear what documents are most appropriate for recording the long-term stewardship activities and obligations associated with each decision, and what criteria are appropriate for evaluating the long-term stewardship implications of remedial decisions. Each of these challenges is discussed below.

3.2 Documenting Long-term Stewardship Obligations During the Selection and Implementation of Cleanup Actions

Some observers have expressed concerns that decision documents (e.g., Records of Decision under CERCLA) do not explicitly identify all of the long-term stewardship activities associated with the selected remedy. Records of Decision come relatively early in the overall cleanup process (see Exhibit 3-2), at a time when many details of the final remedy are not always known. Preliminary and Final Close-out Reports and other documents developed later in the cleanup process provide more specific information about the constructed remedy and requirements for operation, maintenance, and monitoring of the remedy.

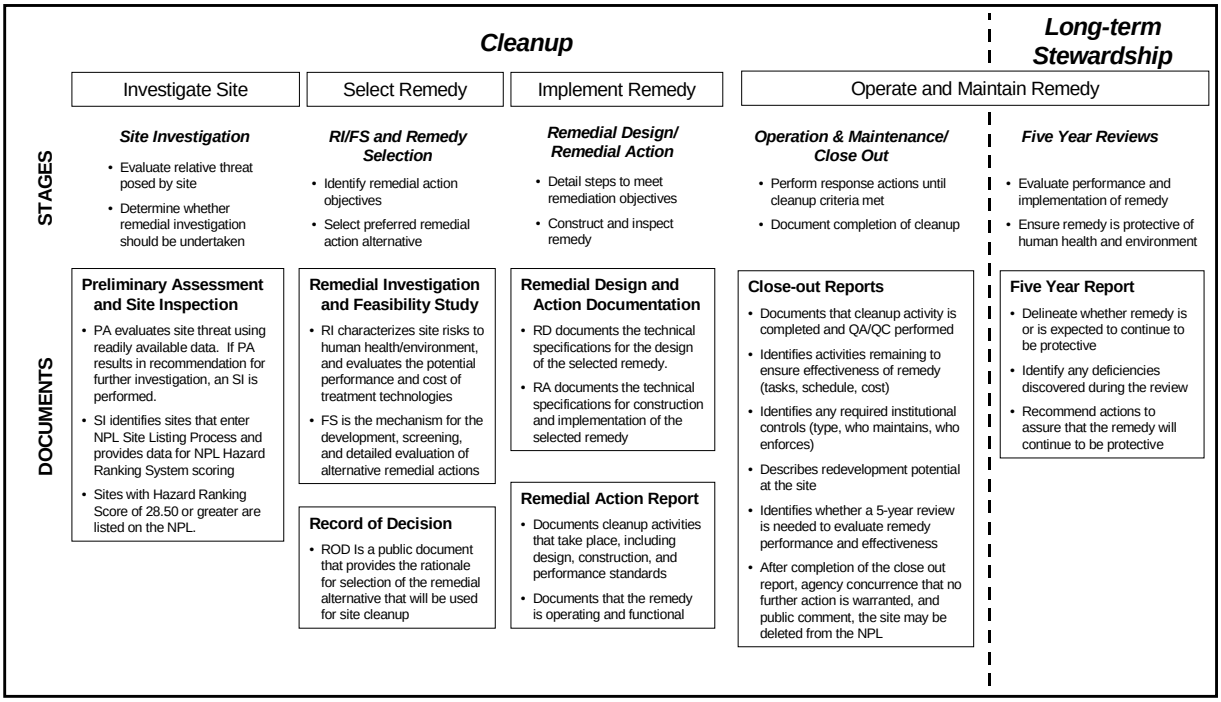
Although documents such as Close-out Reports identify the types of institutional controls required for a specific cleanup action, institutional controls required for a number of individual cleanup actions are addressed through area- or site-wide land use plans (see Chapter 5). Most Regional offices of the U.S. Environmental Protection Agency (EPA) have developed institutional controls policies that require federal sites to develop and maintain Land Use Control Assurance Plans or their equivalent. For remedies that depend upon land use controls for the protectiveness of the remedy, EPA Region 4 Federal Facilities Branch has issued a policy memorandum on land use controls at Federal Facilities.[14] Region 4 policy is to require, as a precondition to concurrence on any remedial action that relies on land use controls for the protectiveness of the remedy, that the lead federal agency seeking EPA concurrence commit itself to implementing a detailed written Land Use Control Assurance Plan (LUCAP) designed to assure the effectiveness and reliability of the land use controls for as long as they are required to maintain the protectiveness of the remedy. A LUCAP may be documented in a Memorandum of Agreement, Federal Facility Agreement, or Record of Decision.

---

[13] *Using Remedy Monitoring Plans to Ensure Remedy Effectiveness and Appropriate Modifications.* U.S. Department of Energy, Office of Environmental Policy and Assistance, RCRA/CERCLA Information Brief. DOE/EH-413/9809, July 1998. *Assessment of Short-term and Long-term Risks for Remedy Selection*. U.S. Department of Energy, Office of Environmental Policy and Assistance, CERCLA Information Brief. DOE/EH-413/9708, August 1997. These documents are available at *http://tis.eh.doe.gov/portal/ksmlinkReg.htm*.

[14] *Assuring Land Use Controls at Federal Facilities.* U.S. Environmental Protection Agency, Region 4, Federal Facilities Branch, Memorandum 4WD-FFB, April 1998.

Exhibit 3-2. Highlights of the CERCLA Remedial Action Process*



*The cleanup process under RCRA is similar but uses different terminology.

According to DOE guidance,[15] documentation for the proposed and final remedy should describe the criteria used to evaluate each remedial alternative with respect to long-term stewardship and how long-term stewardship was considered in the decision making process. For example:

> *The potentially feasible institutional controls will be bounded by:*
>
> - *Short and long term land-use expectations (e.g., current industrial, future residential, future recreational green space);*
> - *Availability of enforcement mechanisms (e.g., property owner controls, third parties, local government, state government); and*
> - *Community acceptance of the response action.*[16]

The documentation also should describe how each remedial alternative and its associated long-term stewardship requirements are related to the anticipated future land use, and particularly should describe systems and procedures that will be implemented to maintain the anticipated land use. The Department is currently evaluating whether it may be appropriate to consider supplemental documentation for older decisions that do not fully describe long-term stewardship issues.

[15] *Institutional Controls in RCRA and CERCLA Response Actions*. U.S. Department of Energy, Office of Environmental Policy and Guidance, RCRA/CERCLA Division, DOE/EH-413-0004, August 2000; *Planning and Implementing RCRA/CERCLA Closure and Post-Closure Care when Wastes Will Remain On Site*. U.S. Department of Energy, Office of Environmental Policy and Assistance, DOE/EH-413-9910, October 1999.

[16] *Institutional Controls in RCRA and CERCLA Response Actions*, page 29.

It is not clear whether decision documents such as CERCLA Records of Decision are the most appropriate documents for recording specific long-term stewardship requirements and obligations. On the one hand, CERCLA Records of Decision are enforceable federal requirements developed with well-defined public involvement processes; and they are highly visible public documents. Including long-term stewardship requirements in CERCLA Records of Decision would ensure that these requirements are considered early in the remedy selection process. On the other hand, many cleanups are conducted pursuant to other, non-CERCLA authorities (e.g., AEA, state laws) which may differ in the requirements for the consideration of remedial alternatives. Moreover, many removal actions under CERCLA are not based on Records of Decision, and decision documents often cover only part of an overall long-term stewardship problem (e.g., they cover one operable unit at a large site, or there may be separate Records of Decision for groundwater and soil contamination). In addition, remedies may need to be adjusted based on information that becomes available during design and implementation stage.

Remedy Monitoring Plans

DOE guidance recommends development of a remedy monitoring plan (RMP) to identify the objectives, schedules, information, procedures, technologies, and personnel necessary to monitor and ensure the continued effectiveness of a remedy. The plans would include evaluation of the compliance of the remedy with applicable standards; continued performance of the design, operation, and maintenance of the remedy; and continued maintenance of the land use upon which the remedy selection was based. The RMP also should include provisions for modifying the RMP and/or the remedy itself to respond to changes in land use, advances in technology, changes in remedy performance, or changes in site characteristics. The RMP should be established as part of the decision document for the remedy. To the extent feasible, a preliminary draft RMP should be developed for each remedy being considered in the remedy selection process to identify the long-term stewardship requirements for each alternative being considered. In cases where RMPs for individual remedial actions are impractical (e.g., many separate areas of concern within a larger area or site), it may be possible to extend the concept of the RMP to an entire site or major portions of a site.

Source: Using Remedy Monitoring Plans to Ensure Remedy Effectiveness and Appropriate Modifications. U.S. Department of Energy, Office of Environmental Policy and Assistance, RCRA/CERCLA Information Brief, DOE/EH-413-9809, July 1998.

It may be more practical to build upon existing Remedy Monitoring Plans (RMPs) or their functional equivalent to both establish the high-level goals for long-term stewardship (e.g., protecting a key natural resource, facilitating economic development of the site) and provide more specific details about long-term stewardship requirements. There is no direct regulatory driver for a long-term stewardship RMP. However, CERCLA and other environmental laws and regulations require remedies to be monitored. The enhanced RMP could apply either to a specific cleanup project or to a site/area in general. It would provide a formal basis for developing and evaluating long-term stewardship plans and requirements, while at the same time preserving the flexibility to modify approaches as new information becomes available. The RMP also could be used for self-regulated DOE activities (e.g., facility disposition, on-site disposal of low-level waste), although any such plans would need to incorporate the performance assessment (PA) and composite analysis (CA) required by DOE Order 435.1 for each low-level waste disposal facility (see Section 5.2).

3.3 Criteria for Evaluating Long-term Stewardship Requirements During Remedy Selection

Several criteria and recommendations for evaluating long-term stewardship requirements during remedy selection have been suggested in guidance developed by DOE, EPA, and the Department of Defense (DoD) and in recommendations forwarded to the Department by stakeholders and throughout the public scoping process. These criteria and recommendations and their citations are highlighted in Exhibits 3-3 and 3-4 and summarized below.

- **Ability to demonstrate the long-term effectiveness of institutional controls**. The evaluation of each alternative should include the identification, description, and assessment of existing systems for implementing, enforcing, and funding institutional controls within the site-specific context of affected parties. An alternative that relies upon affected parties to enforce land use controls but does not identify specific mechanisms by which affected parties can enforce these controls should be given less consideration than an alternative for which oversight and enforcement authorities and mechanisms have been clearly identified.

- **Ability to monitor, maintain, and replace engineered controls**. The evaluation of each alternative should include the identification, description, and assessment of the technologies for maintaining, refurbishing, and replacing any required engineered controls at the end of their functional design life. An alternative for which there is no technologically feasible methodology for replacing the engineered control at the end of its functional design life should be given less consideration than an alternative for which periodic replacement is feasible. Similarly, an alternative for which maintenance procedures are difficult to design and implement, or for which data to monitor remedy effectiveness would be difficult to interpret, should be given less consideration than an alternative for which monitoring and maintenance are relatively straightforward. Choices are not always simple. Some monitoring activities may be more difficult to implement and may require more resources to maintain, but produce data that are much more accurate and therefore much more valuable for protecting human health.

- **Ability to identify uncertainties and develop contingency plans**. The evaluation of each alternative should include the identification, description, and assessment of uncertainties related to long-term stewardship requirements. An alternative for which there is considerable uncertainty concerning the functional design life of an engineered control, or the ability to detect and mitigate potential failures, should be given less consideration than an alternative for which there is less uncertainty and clear contingency plans for addressing potential failures.

- **Full life-cycle cost accounting**. The evaluation of each alternative should include an estimate of its full life-cycle cost, including costs for surveillance, maintenance or replacement of engineered controls, and implementation and enforcement of institutional controls. Although the annual long-term stewardship cost of an alternative may represent only a small fraction of the capital cost to implement the alternative, the long-term stewardship costs may be incurred for hundreds or thousands of years. Although engineered controls that are designed to last a long time and be easy to maintain may have large up-front

costs, they may be less expensive in the long run than controls that cost less to build initially but are not expected to last as long. The Department recognizes that it may be difficult to estimate life-cycle costs, particularly early in the remedy evaluation process. Where considerable uncertainty exists, it may be appropriate to develop a range of life-cycle cost estimates based on upper and lower bound design life scenarios to compare one alternative to others (see Chapter 8).

Exhibit 3-3. Criteria Developed by DOE, EPA, and DoD for Evaluating Long-term Stewardship Requirements During Remedy Selection and Implementation

<table>
<tr><th colspan="2">Department of Energy</th></tr>
<tr>
<td>

Long-term Effectiveness of Institutional Controls

- Institutional controls (ICs) must be effective for both current and future conditions. Effectiveness criteria should include durability and monitoring of remedy and ability to modify controls.[1]
- Remedy selection process should assess capacity to identify, implement, and enforce ICs, including existence of the legal authorities.[1]
- DOE should investigate the practicability and cost of ICs as thoroughly as the proposed treatment technology during the remedy selection process.[2]
- DOE should evaluate the long-term risks of remedial alternatives during the feasibility study phase of the remedy selection process to ensure that the "long-term effectiveness and permanence" of each alternative is considered.[3]

Monitoring and Maintenance of Engineered Units

- DOE guidance recognizes that many containment-in-place remedies require monitoring through the use of discrete monitoring points. Discrete points often only indicate data trends and cannot provide conclusive evidence that the remedy is functioning properly.[4]
- DOE should develop remedy monitoring plans to screen each alternative remedy for effectiveness, cost, and implementability. Remedy monitoring plans should be designed to gauge performance of the remedy design, operation, and maintenance and detect engineered or institutional control failure.[4,5]

</td>
<td>

Uncertainty Management / Contingency Planning

- DOE can use Conceptual Site Models to evaluate uncertainties associated with remedial alternatives.
- Remedy monitoring plans should specify under what conditions contingencies must be implemented.[4]
- DOE can use uncertainty matrices to identify impacts of uncertainties associated with engineered and institutional controls, assess uncertainties that may affect performance, and identify contingencies to mitigate potential impacts.[1,6]
- Effectiveness of ICs can be enhanced if the ICs are managed as rolling rather than static systems. IC monitoring plans should allow for systematic reassessment of the need for ICs and effectiveness.[1]

Remedy Life-Cycle Cost Analysis

- Evaluation of ICs requires consideration of life-cycle costs that will be incurred over the length of time the controls will be required to be effective. Remedy evaluations should consider life-cycle costs of ICs, including maintenance of physical control measures, monitoring, and enforcement.[1]
- Some IC life-cycle costs will be incurred by entities other than the federal government. These costs must also be considered in the life-cycle cost analysis.[1]
- The DOE Offices of Site Closure and Long-term Stewardship will ensure that sites create Long-term Surveillance and Maintenance (LTSM) programs that will estimate continuous and intermittent costs.[7]

</td>
</tr>
<tr><th colspan="2">Environmental Protection Agency</th></tr>
<tr>
<td>

Long-term Effectiveness of Institutional Controls

- EPA remedy selection criteria used to evaluate the long-term effectiveness of ICs also can be used to evaluate the potential for the controls to fail.[8]
- In evaluating remedies EPA should determine the existence of the authority and ability and resolve of the implementing entity to implement controls.[8,9,10]
- EPA should evaluate ICs as rigorously as proposed engineered controls and should evaluate long-term effectiveness and permanence of the ICs.[8,10,11,12]
- A remedy that relies on ICs should be selected only if the ICs will be effective and enforceable against both current and potential future property owners.[8]
- DOE facilities should develop and implement land use control assurance plans that identify procedures to ensure ICs remain effective, prior to agency approval of the remedy.[12]

</td>
<td>

Uncertainty Management/Contingency Planning

- Institutional Control Plans developed for selected remedies should identify and establish contingencies to be implemented in the event of control failures.[8]

Remedy Life-Cycle Cost Analysis

- Cost estimates developed for remedial alternatives should incorporate remedy capital costs and lifetime operation and maintenance costs.[13]
- The remedy selection process should include a comparison of long-term risks and costs of leaving a residual hazard in place versus permanent remedies that do not require ICs. Long-term costs of leaving residual hazards in place include cost to implement and maintain engineered controls and cost to implement contingencies for control failures.[8]

</td>
</tr>
</table>

Department of Defense	
Long-term Effectiveness of Institutional Controls • DoD reserves the right to enforce ICs and include enforcement language in land transfer documents.[14] • DoD should consider the pros and cons of establishing and maintaining ICs in the remedy process.[16] • DoD guidance recommends that, to the extent allowable by state and local law, ICs should "run with the land" and be enforceable by all prior owners of property and other third parties.[16] **Monitoring and Maintenance of Engineered Units** • DoD advocates establishment of ongoing long-term monitoring optimization programs to maintain the maximum effectiveness for monitoring engineered and institutional controls. Monitoring programs should be reviewed and updated periodically.[15]	• Property transfer agreements will include provisions for continued access to DoD to conduct five year reviews and effectiveness monitoring.[17] **Remedy Life-Cycle Cost Analysis** • Feasibility studies for remedial alternatives should analyze the relative cost of implementation and monitoring of ICs.[15] • To ensure effectiveness of ICs, stakeholders may need to coordinate long-term responsibilities for implementation among federal and local entities and determine resources that are needed and/or available to implement controls.[15] • DoD recommends periodic cost analysis review of long-term monitoring systems. DoD's Remedial Actions Cost Engineering and Requirements tool facilitates comparison of long-term monitoring program costs.[18]

1. Institutional Controls in RCRA and CERCLA Response Actions. U.S. Department of Energy, Office of Environmental Policy and Guidance, RCRA/CERCLA Division, DOE/EH-413-0004, August 2000.
2. Effects of Future Land Use Assumptions on Environmental Restoration Decision Making. U.S. Department of Energy, Office of Environmental Policy and Assistance, RCRA/CERCLA Information Brief, DOE/EH-413/9810, July 1998.
3. Assessment of Short-Term and Long-Term Risks for Remedy Selection. U.S. Department of Energy, Office of Environmental Policy and Assistance, CERCLA Information Brief, DOE/EH-413/9708, August 1997.
4. Planning and Implementing RCRA/CERCLA Closure and Post-Closure Care when Wastes Will Remain On Site. U.S. Department of Energy, Office of Environmental Policy and Assistance, DOE/EH-413-9910, October 1999.
5. Using Remedy Monitoring Plans to Ensure Remedy Effectiveness and Appropriate Modifications. U.S. Department of Energy, Office of Environmental Policy and Assistance, RCRA/CERCLA Information Brief, DOE/EH-413-9809, July 1998.
6. Uncertainty Management: Expediting Cleanup through Contingency Planning. U.S. Department of Energy, Office of Environmental Management and Office of Environmental Safety and Health, DOE/EH/(CERCLA)-002, February 1997.
7. Self-Assessment of Business Close-Out Activities. U.S. Department of Energy. Office of Site Closure, March 15, 2000.
8. Use of Institutional Controls in the RCRA Corrective Action Program. U.S. Environmental Protection Agency, Region 5, Waste , Pesticides, and Toxics Division, March 2000.
9. Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, and Office of Radiation and Indoor Air, OSWER No. 9200-4.18, August 22, 1997.
10. Land Use in the CERCLA Remedy Selection Process. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, EPA OSWER Directive No. 9355.7-04, May 1995.
11. Region X Final Policy on the Use of Institutional Controls at Federal Facilities. U.S. Environmental Protection Agency, Region 10, Office of Environmental Cleanup Memorandum, May 1999.
12. Assuring Land Use Controls at Federal Facilities. U.S. Environmental Protection Agency, Region 4, Federal Facilities Branch, Memorandum 4WD-FFB, April 1998.
13. The Role of Cost in the Superfund Remedy Selection Process. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Publication 9200-3-23FS, EPA 540/F-96/018, September 1996.
14. DoD Responsibility for Additional Environmental Cleanup After Transfer of Real Property. U.S. Department of Defense, located at *www.dtic.mil/envirodoc/brac.flu.html* July 25, 1997.
15. The Environmental Site Closeout Process Guide. U.S. Department of Defense, Air Force Base Conversion Agency, September 1999.
16. A Guide to Establishing Institutional Controls at Closing Military Installations. U.S. Department of Defense, February 1998.
17. DoD Guidance on the Environmental Review Process to Reach a Finding of Suitability to Transfer for Property where Release or Disposal has Occurred. U.S. Department of Defense, located at *http://emmisary.acq.osd.mil/bccr/brim*, June 1, 1994.
18. Long-Term Monitoring Optimization Guide. U.S. Department of Defense, Air Force Center for Environmental Excellence, located at *http://www/afbca.hq.af.mil/closeout/*.

Exhibit 3-4. Recommendations by Affected Parties for Considering Long-term Stewardship During Remedy Selection and Implementation

Long-term Effectiveness of Institutional Controls

- The goals of institutional controls, the types of controls required, and control implementation and maintenance should be evaluated for each alternative in the remedy selection process.[1]
- DOE should retain ownership of land requiring institutional controls unless affected state or Tribal governments certify that adequate institutions and legal mechanisms exist to implement and enforce such controls.[1]
- DOE sites need to prepare site stewardship plans that address the legal authority and enforcement of institutional controls, as well as the effects of property transfers to other agencies or non-federal owners.[6]
- The Assistant Secretary should evaluate the applicability and reliability of available non-physical institutional controls, with particular attention to their effectiveness, enforceability, and permanence. The evaluation should consider controls on lands held in federal ownership and lands leased or sold to private individuals or entities.[7]
- The Assistant Secretary should evaluate the capabilities of relevant public and private institutions to effectively implement and administer institutional controls over time; and should ensure that remediation and institutional controls have overlapping and/or redundant requirements.[7]

Monitoring/Maintenance of Engineered Units/Verification of Remedy Monitoring Data

- DOE should identify for each engineered control remedy the expected design life of the remedy and associated repair or replacement costs that can be expected to be incurred by future generations.[2]
- DOE should establish a stewardship research program designed to understand the ecological and social impacts of residual hazards and to devise new and improved long-term remediation methods and technologies.[2]
- DOE sites need to prepare site stewardship plans that address monitoring and maintenance of facilities and physical controls.[6]
- The Assistant Secretary should require periodic review of all sites to evaluate the effectiveness of remediation decisions and institutional and physical controls, in light of technology development, changing environmental and contamination conditions, and costs.[7]

Information Management

- DOE should establish mechanisms for the collection, retrieval, and storage of site data and information necessary for long-term stewardship and preservation of cultural and historic resources.[1,6]
- DOE should collect, preserve, and integrate all information needed for long-term stewardship into its information management system, and incorporate stewardship activities into a project management and tracking system to provide track the progress of and provide stewards with timely notification of stewardship activities.[2]
- DOE should implement effective procedures for managing contaminated land notices to ensure that they are found in property title searches, and incorporate information on land use restrictions in state, county, and city information systems.[2]
- DOE should jointly manage and link databases of land use information with local land use agencies, and consider establishing cooperative planning entities with local and state planning agencies.[5]
- DOE should immediately suspend the operation of protocols that require the routine destruction of relevant records. DOE should coordinate its information activities with the work of the Secretary's Openness Committee to identify and provide for the management of records relevant to long-term stewardship.[6]
- DOE should create a geographically based or other type of database for stewardship information. The database should be a means to informing decisions, and any form that the database takes should be durable.[6]
- DOE should identify its "stewardship baseline" - the specific items of information that are necessary to plan and carry out long-term stewardship.[6]
- The Assistant Secretary should create a publicly available information system that identifies waste sites, location, characteristics, controls, and contingency plans; and should develop options for maintaining remediation and institutional control records at several government levels (local, state, tribal, national).[7]

Exhibit 3-4 (continued)

Uncertainty Management and Contingency Planning

- For decisions that include long-term institutional controls or monitoring and maintenance of engineered controls. DOE should develop methods for accurately reflecting such commitments in the decision process or identify and emphasize uncertainties surrounding such commitments.[1]
- DOE sites should prepare stewardship plans that include contingency planning for potential identification of new contamination or failure of remedy.[6]
- The Assistant Secretary should develop contingency plans for reasonably forseeable failures of remediation and/or physical and institutional controls.[7]

Remedy Life-Cycle Cost Analysis and Funding Mechanisms

- DOE's current method of costing long-term institutional controls does not accurately reflect the relative cost of long-term stewardship activities. If present worth values are used to compare the cost of remedial alternatives, annual costs associated with the use of institutional controls becomes negligible beyond a few decades. DOE should more fully explain and quantify the required long-term cost and funding commitment required for long-term institutional controls, and develop plans to ensure availability of adequate funding for such controls.[1]
- DOE should formally acknowledge that remedy decisions requiring long-term institutional controls will not be considered final until DOE can implement an acceptable stewardship program that includes an acceptable funding mechanism.[1]
- For new facilities and missions DOE should address the closure and long-term stewardship commitments associated with the facility or mission in the initial approval decision, and make provisions for funding of the closure and post-closure operation of the new facility or mission.[1]
- DOE should promote mechanisms for funding stewardship that do not depend upon annual appropriations, with trust funds being the preferred approach. At a minimum an adequate principal should be set aside to produce sufficient income to fund long-term monitoring of residual hazards.[2]
- Congress should establish a fund that will generate the required annual budget for stewardship. Until such an independent funding mechanism is established DOE should request stewardship funding as a specific line item in its annual appropriations process.[3]
- DOE should estimate the cost, time frames, and types of activities that will be needed for long-term stewardship at DOE sites.[4]
- DOE should define responsibilities for long-term stewardship, including early involvement of local government and adequate long-term support to local agencies charged with stewardship responsibilities.[5]
- The Assistant Secretary should require full consideration of the estimated life-cycle costs of remediation and long-term institutional controls in order to evaluate the tradeoffs between cleanup and stewardship.[7]

1. Closure for the Seventh Generation: A Report from the Stewardship Committee of the State and Tribal Government Working Group. National Conference of State Legislatures, Washington D.C., February 1999.
2. The Oak Ridge Reservation Stakeholder Report on Stewardship, Vol. 2. Oak Ridge Reservation Stewardship Working Group, December 1999.
3. The Oak Ridge Reservation Stakeholder Report on Stewardship, Vol. 1. Oak Ridge Reservation Stewardship Working Group, July 1998.
4. Probst, K. N., and McGovern, M. H. Long-Term Stewardship and the Nuclear Weapons Complex: The Challenge Ahead. Center for Risk Management, Resources for the Future, Washington D.C., June 1998.
5. Lowrie, K. Local Land Use Planning and Future Use of U.S. DOE Sites: Communication, Coordination, and Commitment, Report 32. Consortium for Risk Evaluation with Stakeholder Participation, September 1999.
6. Bodde, D., Environmental Management Advisory Board Long-term Stewardship Committee Report and Recommendations. October 8, 1998.
7. Bodde, D., and Bennett, Joel. Resolution on Institutional Controls on DOE Properties. Environmental Management Advisory Board, April 17, 2000.

Chapter 4: DOE's Long-term Stewardship Activities

The Department established the Office of Long Term Stewardship in 1999 to help coordinate and communicate long-term stewardship efforts within EM. Coordination is required because the majority of long-term stewardship activities are conducted at individual DOE sites and managed by a variety of programmatic offices at headquarters and in the field. This reflects the fact that long-term stewardship represents an important part of DOE's strategic objective to conduct its missions in a manner that protects human health and the environment.

This chapter describes how long-term stewardship is being planned, managed, and implemented at DOE sites.

APPLICABLE SCOPING COMMENTS
(see Exhibit 2 in Appendix B)

- The Assistant Secretary should ensure that the Long-term Stewardship Office at headquarters has the responsibility and authority for directing policy for long-term stewardship, and for ensuring implementation and accountability in the field (4)
- DOE should create a specific long-term stewardship program office not limited to EM (STGWG)
- DOE should continue to work with stakeholders, regulators, and Tribes to develop an acceptable long-term stewardship program (3, 4, STGWG)
- DOE should discuss long-term stewardship responsibilities at multi-program sites (14)
- DOE should evaluate the pros and cons of different federal agencies performing long-term stewardship activities especially at sites with significant natural resources or historic preservation value (1)
- DOE should continue research and development activities to minimize residual contamination and reduce future long-term stewardship costs (4)
- DOE sites should each develop a long-term stewardship plan that defines costs, constituents, and implementation mechanisms (2)
- The study should examine DOE's existing legislative mandates for maintaining institutional controls over contaminated sites and alternatives for sharing regulatory responsibilities with other federal agencies (6)
- The study should examine alternative internal organization/program strategies that will be needed to maintain long-term stewardship programs (6)

APPLICABLE ISSUES
(see Exhibit 3 in Appendix B)

4. *Regulatory Drivers, Negotiated Agreements, and Legislative Barriers*
7. *Science and Technology Development*
14. *Stewardship Responsibilities at Non-EM Facilities with Continuing Operations and Multi-Purpose Sites*
20. *Enforcement*
23. *Tie National Policy to Stewardship Legislative Mandate*

4.1 What are the Drivers for Long-term Stewardship?

The principal drivers for existing long-term stewardship requirements at DOE sites have been: (1) the legal responsibility of DOE to protect human health and the environment pursuant to AEA; (2) CERCLA, RCRA, UMTRCA, other environmental statutes, and implementing requirements, including Consent Decrees, Federal Facility Agreements, licenses, and permits; (3) Executive Orders; and (4) Treaty obligations pertaining to Tribal governments.[17] More than 100 Executive Orders, statutes, regulations, and compliance agreements and Treaty obligations may affect long-term

[17]The *Executive Memorandum for the Heads of Executive Departments and Agencies on the Government-to-Government Relations with Native American Tribal Governments* (April 29, 1994) enumerates the federal government's responsibility to operate within a government-to-government relationship with federally-recognized Native American tribes.

stewardship activities.[18] Many of these requirements were developed for other purposes, not specifically for long-term stewardship. Specific requirements for long-term stewardship that apply to DOE include:

- Ensuring compliance through routine surveillance and monitoring under AEA and DOE Order 5400.1, General Environmental Protection Program, and DOE Order 5400.5 Radiation Protection of the Public and the Environment, for sites contaminated with radioactive materials.

- Implementing the long-term surveillance and maintenance requirements established by Titles I and II of the Uranium Mill Tailings Radiation Control Act (UMTRCA, 10 CFR Part 40.27-28).

- Where contaminants are left in place, conducting five-year performance reviews for sites remediated under CERCLA (40 CFR Part 300.430).

- Implementing post-closure maintenance and monitoring, and periodic performance reviews for sites remediated under RCRA, which requires a minimum of 30 years of post-closure care (40 CFR Part 264.117).

- Ensuring compliance with long-term monitoring, maintenance, and institutional controls requirements for the Waste Isolation Pilot Plant (WIPP) in New Mexico established by the WIPP Land Withdrawal Act (Public Law 102-579) and regulations promulgated under this statute (40 CFR Parts 191 and 194).

- Ensuring compliance with applicable statutory and regulatory requirements and Executive Orders protecting natural resources and cultural resources (see Chapter 9).

- Ensuring compliance with DOE Order 1230.2, American Indian Tribal Government Policy, and ensuring that obligations under the Federal Indian Trust Responsibility (Seminole Nation v. United States, 1942) and treaty obligations are met.[19]

- Ensuring compliance with DOE Orders on facility and land use planning (430 Series).

- Ensuring compliance with DOE Order 435.1, Radioactive Waste Management, for designing and maintaining low-level waste disposal cells.

---

[18]Appendix D summarizes major statues, regulations, and Executive Orders that require DOE to conduct miscellaneous long-term stewardship activities

[19]Tribal governments have a special and unique legal and political relationship with the US Government, defined by history, treaties, statutes, court decisions, and the US Constitution. The United States has entered into more than 600 treaties and agreements with American Indian Tribes. These treaties and agreements create a variety of legal responsibilities by the United States toward Tribes and provide the basis for a government-to-government relationship. Although the Department of the Interior, through the Bureau of Indian Affairs, has the principal responsibility for upholding obligations of the federal government to American Indians, this responsibility extends to all federal agencies, including DOE. *Source*: DOE Order 1230.2 *American Indian Tribal Government Policy*. April 8, 1992, available at *http://www.explorer.doe.gov:1776*.

The concept of long-term stewardship is partially incorporated into CERCLA, RCRA, DOE Orders, NRC regulations, state laws, and supporting regulations and guidelines.[20] However, differences in requirements and standards in existing regulations, as well as the unique circumstances for each site, could lead to a patchwork of different regulatory requirements for similar long-term stewardship activities. The resulting patchwork of regulatory requirements will make it difficult to manage long-term stewardship activities. The Department is reviewing options for developing additional policy and guidance to clarify the regulatory requirements pertaining to long-term stewardship.

Advisory Groups' Recommendations for Establishing a Long-term Stewardship Program within DOE

"DOE should create a specific program office to manage stewardship responsibilities. This is needed because stewardship at DOE sites is not limited only to Environmental Management (EM) programs. Stewardship may be required during cleanup or closure and during operation of related facilities with continuing missions"

Source: Closure for the Seventh Generation: A Report from the Stewardship Committee of the State and Tribal Government Working Group. National Conference of State Legislatures, Denver CO, February 1999.

"The Environmental Management Advisory Board recommends that the Assistant Secretary take the following steps in the coming months to assure that long-term stewardship remains a major focus of the EM program:

- Promulgate a formal policy (that is, DOE Order or similar document) that requires the sites to plan for and implement long-term stewardship.
- Establish a distinct budget for long-term stewardship at Headquarters, Operations, and site levels.
- Ensure that the Long Term Stewardship Office in Headquarters has the responsibility and authority for directing policy for long-term stewardship, and for ensuring implementation and accountability in the field.
- Assure that relevant state, tribal, and local governments are fully informed of information resources and DOE activities relating to long-term stewardship.
- Provide the general public with ready access to long-term stewardship information and activities to facilitate public participation in decisions regarding long-term stewardship."

Source: Letter from Dr. David L. Bodde and Joel H. Bennett, Co-Chairs, Environmental Management Advisory Board, April 17, 2000.

As long as the federal government retains ownership or control of sites, long-term stewardship requirements established in site-specific compliance agreements and in laws, regulations, and treaties will remain applicable and enforceable. If ownership is transferred to a non-federal entity (e.g., states, Tribes, local governments, private entities), it may be difficult to ensure the long-term enforceability of existing requirements and associated compliance oversight.[21] DOE has not traditionally established specific monitoring or oversight provisions for property transfers and other activities that rely upon local institutional control mechanisms.[22]

---

[20]*The Long-Term Control of Property: Overview of Requirements in Orders DOE 5400.12 & DOE 5400.5*. U.S. Department of Energy, Office of Environmental Policy and Assistance, Information Brief. EH-412-0014/1099, October 1999.

[21]*Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfers*, U.S. Department of Energy, Office of Environmental Policy and Assistance. DOE/EH-413/97/2, October 1997; *CERCLA Requirements Associated with Real Property Transfers*, U.S. Department of Energy, Office of Environmental Policy and Assistance, CERCLA Information Brief. EH-413-9808, April 1998.

[22]Specific monitoring or oversight provisions may be needed when DOE transfers land to a non-federal entity (see the example of groundwater use restrictions at the Oak Ridge Reservation in Section 5.3) or leases on-site facilities to non-federal entities (see the example of site institutional controls at the Mound Environmental

The Department of Defense (DoD) has faced a similar issue associated with property transfers under the Base Realignment and Closure (BRAC) process. Congress originally authorized BRAC under Public Law 100-526, the Defense Authorization Amendments and Base Closure and Realignment Act for FY 1988, and has modified the process in subsequent legislation, primarily through provisions contained in the National Defense Authorization Acts for FY 1992 through FY 1997. Since 1988, DoD has successfully transferred ownership of many former military installations for economic re-use or natural resource conservation under the BRAC program. Some of these installations require long-term stewardship after property transfer. Such long-term stewardship activities generally are conducted by DoD but may also be conducted by the property owner, local government, or other entities. When appropriate, DoD retains access rights to transferred BRAC properties for the purposes of conducting long-term stewardship and additional cleanup activities (if required) under the provisions of the land transfer agreements.

ASTM Standards for Environmental Site Assessments

The American Society for Testing and Materials (ASTM) has developed standard practices for conducting environmental site assessments for commercial real estate. The standards were developed to assist purchasers of the property in qualifying for the "innocent landowner" defense to CERCLA liability; i.e., they had conducted "all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice" as defined in 42 U.S.C. §9601(35)(B). The standards include practices and procedures for the identification and documentation of the presence or likely presence of any CERCLA hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release into structures on the property or into the ground, groundwater, or surface water of the property.

Source: ASTM Standard E1527-97 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process; ASTM Standard E1903-97 Standard Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process.

DoD currently requires that an environmental baseline survey be conducted for all DoD property that is under consideration for transfer by lease or deed to any non-federal government entity. Environmental baseline surveys are used to support Finding of Suitability for Lease (FOSL) and Finding of Suitability for Transfer (FOST) determinations, and are incorporated into property transfer documents. ASTM also has developed a standard classification of environmental condition of property for DoD BRAC facilities that is used to support the DoD environmental baseline survey and FOSL/FOST process.[23]

4.2 How is Long-term Stewardship Currently Managed and Implemented by DOE?

As with other Departmental activities, DOE's long-term stewardship responsibilities are divided among headquarters and field elements. DOE headquarters offices are responsible for developing policy, guidance, and internal requirements (DOE Orders); providing programmatic oversight; providing funding advocacy; and communicating with representatives of national stakeholder and Tribal organizations. The Office of Long Term Stewardship (EM-51) is responsible for coordinating such activities with respect to long-term stewardship. DOE has

Management Project in Section 6.2).

[23]ASTM Standard D5746-98 Standard Classification of Environmental Condition of Property Area Types for Defense Base Closure and Realignment Facilities.

established procedures that require involvement and coordination among DOE Principal Secretarial Offices (PSOs) and Deputy Administrators (within the NNSA) in the development of policies, guidance, and DOE Orders. EM-51 has the lead for long-term stewardship policy and guidance development and works in coordination with the Office of Environment, Safety, and Health (EH) to ensure that policy and guidance pertaining to long-term stewardship is consistent with existing Departmental policies and guidance. The DOE field offices are responsible for the implementation of long-term stewardship through planning, developing budgets, and managing the projects that include long-term stewardship activities. The Grand Junction Office, which reports to the Albuquerque Operations Office, has project management responsibility over the majority of the projects currently in the long-term stewardship phase (see Section 4.2.2).

As cleanup actions are completed at certain EM sites (e.g., Pinellas, Weldon Spring), the Grand Junction Office will assume responsibility for long-term stewardship. The DOE Office of Science will assume long-term stewardship responsibility when cleanup is complete at the Princeton Plasma Physics Laboratory in New Jersey. At other EM sites, responsibility for long-term stewardship after cleanup actions are complete has not yet been assigned.

Five Key Principles for Effective Long-term Stewardship

The National Research Council recently recommended that DOE commit the time and funding needed to develop and implement effective institutional management plans devoted to five key principles:

1. *Plan for uncertainty* by anticipating a range of possible outcomes of cleanup strategies and post remediation institutional management strategies and adding uncertainty by applying uncertainty ranges.

2. *Plan for fallibility* in cleanup strategies and post remediation institutional management strategies by selected site uses that are less likely to be subject to frequent change, and that assure that information about contaminated sites is preserved and communicated effectively to future site users.

3. *Develop appropriate and substantive incentive structures*, including stable long-term funding structures, access to needed resources, and encourage active citizen oversight of long-term institutional management.

4. *Undertake scientific, technical, and social research and development*, including research and development for contaminant reduction, contaminant isolation, and stewardship measures.

5. *Plan to maximize follow-through* by implementing an iterative, long-term institutional management strategy that allows for adaptation to changing conditions or unexpected outcomes and allows for follow through on successive phases of the institutional management plan.

Source: Long-Term Institutional Management of U.S. Department of Energy Legacy Waste Sites. National Academy of Sciences, National Research Council, August 2000

4.2.1 Office of Long Term Stewardship

The Office of Long Term Stewardship provides support and coordination among the other EM program offices, EH, and other PSOs. The Office has a major role in identifying policy and guidance needs; working with other offices within DOE – including the NNSA – to develop and implement policies and communicate with national stakeholder and Tribal organizations; and

coordinating with research and development (R&D) organizations internal and external to DOE. To meet these responsibilities, the Office performs several functions.

- **Drafting policy:** The Office works with other DOE offices to draft policies for implementing and managing long-term stewardship activities at DOE sites. The Office also sponsors independent research on specific long-term stewardship policy issues and ensures integration with existing DOE policies.

- **Coordination and communication:** The Office coordinates the DOE Working Group on long-term stewardship; prepares reports such as this *Draft Study* and the companion Report to Congress; maintains information systems such as the long-term stewardship web page (*http://lts.apps.em.doe.gov/*); and provides liaison to national stakeholder and Tribal organizations involved in long-term stewardship.

- **Drafting guidance:** Although long-term stewardship activities at a site will be driven by site-specific factors and requirements, some practices are addressed consistently across sites. The Office works with EH, other EM program offices, and other PSOs to draft guidance for issues such as contracting strategies, negotiated agreements, and development of site-specific implementation plans. Guidance for long-term stewardship is developed using existing administrative processes already established within DOE.

- **Developing performance measures:** The Office is working with other EM program offices to develop performance measures to evaluate whether long-term stewardship functions are being performed adequately and cost effectively and to determine whether needed research and development is being performed or given sufficient priority.

- **Managing data:** The Office oversees the development and implementation of the Central Internet Database pursuant to the 1998 PEIS settlement agreement to track the location of residual hazards and their movement through shipments of waste and materials among sites. The Office also coordinates with the DOE Chief Information Officer to develop and support policies that ensure the collection, preservation, and accessibility of the information necessary to support long-term stewardship activities.

- **Identifying needs of science and technology for long-term stewardship:** The Office coordinates with organizations within the EM program responsible for planning and implementing long-term stewardship and EM program organizations responsible for science and technology development to identify new science and technology needed to enhance protectiveness and reduce costs during long-term stewardship and identify strategies for meeting these needs.

DOE Long-term Stewardship Working Group

In 1998, DOE convened the Long-term Stewardship Working Group to provide a forum for field and headquarters personnel to coordinate and facilitate long-term stewardship planning and implementation.

- The initial objective was to ensure that personnel involved in cleanup and post-cleanup activities are informed of ongoing and planned research, planning, and implementation activities related to long-term stewardship. This improved opportunities for leveraging expertise and resources to efficiently address long-term stewardship issues and concerns.

- The near-term objective is to begin to address the many challenges associated with long-term stewardship in a coordinated fashion and to establish an understanding of how expertise within the Department (e.g., at Grand Junction Office and headquarters programs) can be applied to these issues and concerns.

- The longer-term objective is to develop an understanding of what it will require to maintain a viable commitment to long-term stewardship over multiple generations and to define appropriate roles for headquarters and field elements in meeting that commitment.

Appendix H provides a listing of the current principal Working Group Members and the areas they represent. The list will be updated periodically on the long-term stewardship information center web site (***http//lts.apps.em.doe.gov***)

- **Incorporating research and development in science and technology:** To ensure that developments in science, technology, and other areas of knowledge become incorporated into long-term stewardship strategies at sites, the Office provides information to sites on strategies, science, and technologies that are available at other DOE sites, other federal agencies, and in the private sector. The Office also performs analyses to re-evaluate and, in concert with federal regulators, modify as necessary national long-term stewardship strategies based on new science and technology.

- **Supporting and scrutinizing proposed EM funding for long-term stewardship:** The Office reviews proposed budgets and plans for long-term stewardship and provides advocacy for long-term stewardship funding in the annual budget process. The Office also evaluates alternative funding mechanisms as appropriate.

4.2.2 Implementation of Long-term Stewardship Activities

Long-term stewardship activities at the site level include RCRA post-closure monitoring, CERCLA five-year reviews, and long-term monitoring and maintenance activities pursuant to AEA, DOE Orders, NRC license requirements (e.g., at uranium mill tailings sites) and site-specific requirements. DOE field offices also have begun to issue long-term stewardship guidance. For example, the Ohio Field Office has issued guiding principles for long-term stewardship that address stakeholder and regulator involvement, institutional controls, funding, review of cleanup remedies, technology development and implementation, communication, and conservation of resources.[24]

[24] *Guiding Principles for Long-Term Stewardship*. U.S. Department of Energy, Ohio Field Office, Miamisburg, OH, March 27, 2000.

Long-term stewardship is budgeted and managed in different ways at different sites across the DOE complex. Some sites have established long-term stewardship as a specific project with a distinct budget. Other sites include long-term stewardship as part of each cleanup project. Many long-term stewardship activities (e.g., records management, site security) are included as part of the overall infrastructure maintenance activities. Where long-term stewardship activities are budgeted within site overhead accounts, it is difficult to attribute costs to the precise areas undergoing long-term stewardship and identify the overall scope of long-term stewardship activities currently underway. This information should be most complete at sites where cleanup and closure are the sole mission, particularly where closure is expected before 2006. To better understand long-term stewardship activities and costs, many DOE sites will have an independent post-closure Project Baseline Summary (ledger for tracking cost and progress in support of the EM annual budget) for long-term stewardship by Fiscal Year 2003.[25] As noted in Chapter 1, the companion *Report to Congress* will identify sites or portions of sites where cleanup is complete or expected to be complete by 2006, and the scope of long-term stewardship activities anticipated for these areas.

The Grand Junction Office (GJO) in Colorado is currently responsible for long-term stewardship at 26 sites where cleanup is complete and expects to become responsible for two more sites by 2003 (Exhibit 4-1). The mission of GJO is to assume long-term custody of these sites and provide a common basis for their operation, security, surveillance, monitoring, maintenance, annual reporting, and emergency response. Sites assigned to GJO include 21 disposal cells that contain encapsulated uranium mill tailings and associated contaminated material; entombed reactors in Nebraska and Ohio; and the Pinellas Site in Florida. Additional sites are anticipated to be transferred to GJO in the future. Some of these sites are presently owned by private parties and regulated under NRC license (i.e., UMTRCA Title II sites).[26] Site-specific long-term stewardship plans are required by law for UMTRCA sites and must be approved by NRC. GJO also requires the development of a site-specific long-term stewardship plan before accepting long-term stewardship responsibilities for any site.[27] This plan must explain how DOE will provide effective long-term stewardship for the site and include:

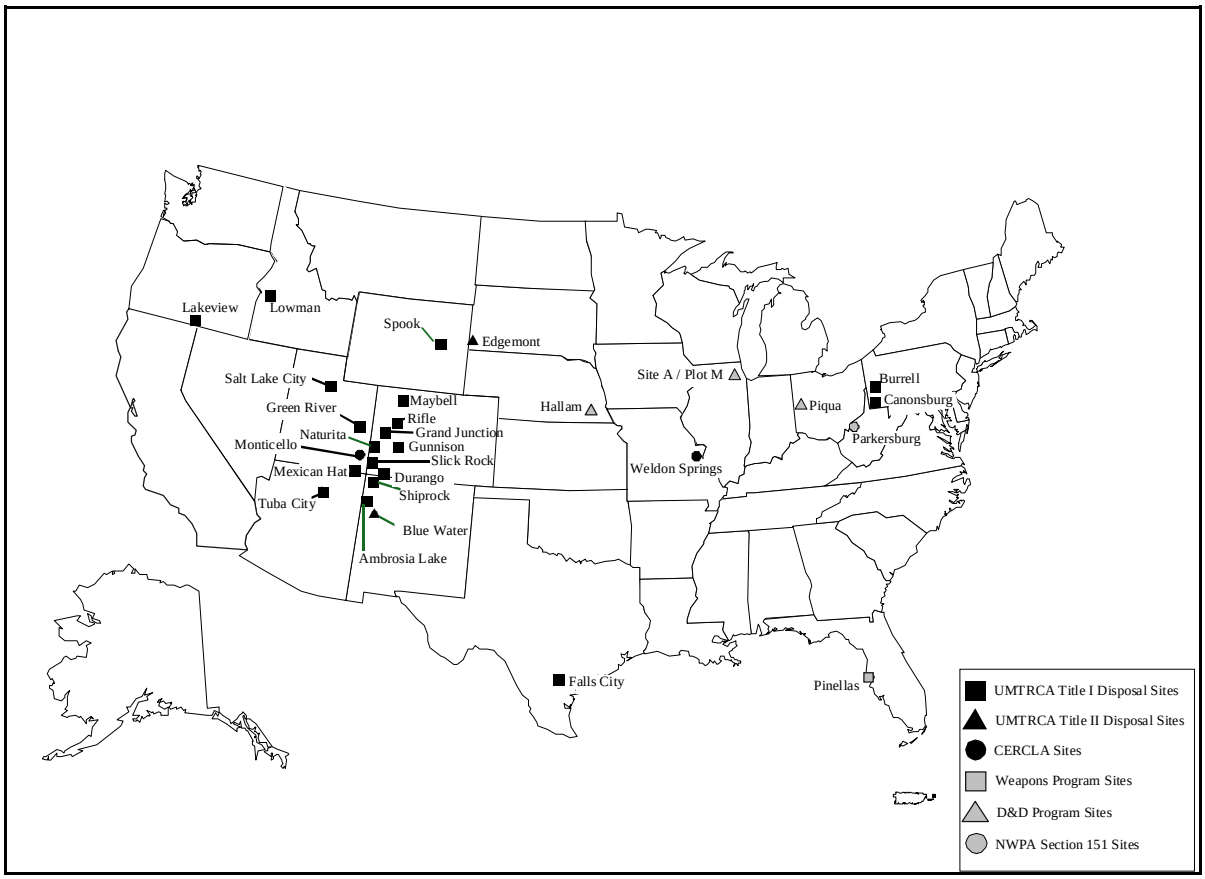
- Legal, regulatory, and other long-term stewardship requirements;
- Institutional controls to be implemented;
- Physical and baseline conditions at the site when long-term stewardship begins;
- History of site operations and cleanup activities;
- Planned surveillance, monitoring, and maintenance activities;
- Emergency response provisions;
- Records management and public information; and
- Cost and schedule.

[25]This requirement applies to sites with EM program funding.

[26]*1999 Long-Term Surveillance and Maintenance Program Report.* U.S. Department of Energy, Grand Junction Office, Grand Junction, Colorado, March 2000.

[27]*Guidance for Implementation of Long-Term Surveillance and Maintenance at DOE Sites in Long-Term Stewardship*. U.S. Department of Energy, Grand Junction Office, Grand Junction, Colorado, December 30, 1999.

Exhibit 4-1. DOE's Grand Junction Office Expects to be Responsible for Long-term Stewardship Activities at 28 or more Sites by 2003



At sites where it has programmatic responsibilities, the Office of Site Closure within EM has initiated a process to evaluate business close-out activities to assist sites in addressing and developing management plans to expedite and monitor progress toward the completion of EM program projects and the transition to long-term stewardship.[28] The self-assessment will use a framework which includes 13 defined activities related to site close-out:

- Establishing contract incentives to maximize contractor efforts to complete EM projects.
- Planning for sale of site/end state to ensure that an early determination is made regarding the post-DOE use(s) of sites and that detailed planning is developed and executed.
- Identifying post-contract benefit liabilities, including pension, medical and life insurance, and post-employment benefits such as severance pay.
- Developing and implementing records disposition plans for contaminated, electronic, transuranic waste, and classified records and the post-closure custodianship of these records.
- Mitigating the effect of any ongoing lawsuits on meeting the schedule for site closure;

[28] *Self Assessment of Business Close-out Activities.* Memorandum from James J. Fiore, Deputy Assistant Secretary for Site Closure, Office of Environmental Management, March 15, 2000. The Draft Plans were completed by June 30, 2000.

- Ensuring that transition plans maximize, to the extent possible, employee options for re-employment or retirement and retain the appropriate labor skill mix.
- Ensuring the development of schedules and approaches for personal property disposal.
- Planning and implementing the re-industrialization or leasing of sites as appropriate.
- Identifying DOE Orders which are no longer necessary to maintain health and safety.
- Documenting effective site closure experiences.
- Providing assistance, as needed, to ensure that the specific needs of the communities near closure sites are being considered and addressed appropriately.
- Developing memoranda of agreement between EM and other DOE PSOs to establish responsibilities for conducting any needed long-term stewardship activities.
- Identifying the specific long-term stewardship responsibilities at the site.

4.2.3 Entities External to DOE

EPA, NRC, state regulatory agencies, and Tribal governments have expressed a strong interest in long-term stewardship. Their role(s) in planning, implementing, and providing oversight of long-term stewardship activities varies among sites. At many sites, EPA, states, and Tribal governments currently provide oversight of DOE cleanup activities conducted pursuant to CERCLA, RCRA, and/or site-specific agreements. Although land use planning in the United States typically is conducted primarily at the local level, certain state and Tribal governments

Role of State Governments in Long-term Stewardship

The roles and responsibilities for state governments in implementing and overseeing long-term stewardship activities will vary depending upon the specific activities to be conducted, the legal authorities for such activities, and site characteristics. At many sites, the division of authority and responsibility between DOE, EPA and state regulatory agencies for remedy selection and implementation, including long-term stewardship, is specified in an Interagency Agreement.[1] For example, EPA and the Washington Department of Ecology oversee long-term stewardship activities associated with remedies for the Hanford Site under the terms of the Hanford Tri-Party Agreement.[2] Many states (referred to as "agreement states") regulate the handling and storage of radioactive material through state regulations pursuant to an agreement with NRC. States also may regulate long-term stewardship pursuant to state hazardous waste laws. States generally retain ownership of groundwater and surface waters, and many states retain authority for land use planning (and have delegated this authority to local governments). State governments also may assume a more prominent role in managing long-term stewardship information and in promoting education and training to ensure the continuity of long-term stewardship across multiple generations. The draft long-term stewardship plan for the Weldon Spring Site in Missouri[3] identifies the State of Missouri as an "oversight steward" for the site. The draft plan also identifies specific roles and responsibilities for the state government, including overseeing access agreements for long-term stewardship activities conducted by DOE on state-owned lands adjacent to the site and providing oversight of long-term stewardship activities required by state regulations.

[1] *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. EPA 540-R-98-031, OSWER 9200.1-23P, July 1999.

[2] *Hanford Federal Facility Agreement and Consent Order*. U.S. Department of Energy, Richland Operations Office; Washington State Department of Ecology; U.S. Environmental Protection Agency, Region 10. EPA Docket Number: 1089-03-04-120, Ecology Docket Number: 89-54, May 15, 1989.

[3] *Stewardship Plan for the Weldon Spring Site, Revision A, April 1999*. Weldon Spring Site Remedial Action Project. DOE/OR/21548-771, April 1999.

also have regulations pertaining to land use.[29] Depending on site-specific situations, local and Tribal governments may play a primary role in the operation of processes that support institutional controls through land and resource use permits, zoning, deed restrictions, easements, and other similar mechanisms (see Chapter 5).

Examples of Management Agreements between DOE and Other Federal Agencies

- *Argonne National Laboratory-East* – DOE is coordinating with state and local governments and the Department of Agriculture to manage the site deer herd.
- *Hanford Site* – The U.S. Fish and Wildlife Service has managed the Saddle Mountain National Wildlife Refuge (recently designated as the Hanford Reach National Monument) since 1971and the Fitzner/Eberhardt Arid Lands Ecology Reserve since 1987.
- *Idaho National Engineering and Environmental Laboratory (INEEL)* – The Bureau of Land Management is responsible for the administration of grazing permits and granting of utility rights of way on portions of the site. More than 300,000 acres are used for cattle and sheep grazing each year.
- *Savannah River Site* – The U.S. Forest Service has managed natural resources at the Savannah River Site since 1952, and responsibilities now include developing land management and ecosystem plans for wildlife and forest resource management, engineering support for soil erosion and watershed management, threatened and endangered species recovery and management, fire control, wetland restoration, and support for site wide planning. Agricultural and timber land acquired for the site in 1952 was heavily degraded at the time, and the land has been restored to both provide a sustainable crop of timber and provide enhanced habitat for endangered species.
- *Several sites* – DOE, in partnership with state and Tribal governments and other federal agencies, is creating land reserves from parts of DOE sites. For example, on June 24, 1999, DOE Secretary Richardson designated 10,000 acres of the Department's Savannah River Site as a biological and wildlife refuge, thereby creating the Crackerneck Wildlife Management Area. Similar preservation activities have been implemented at INEEL, Oak Ridge, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and Rocky Flats. State wildlife agencies or other federal agencies, such as the Bureau of Land Management, will be responsible for management of the areas to protect the unique habitat, and DOE will continue to control custody of the property and maintain responsibility for access controls.

Sources: Conference call with Chicago Operations Office, November 1, 1999; *Hanford Comprehensive Land-Use Plan Environmental Impact Statement* (HCP EIS). DOE/EIS-02222-F, September 1999; *INEEL Comprehensive Facility and Land Use Plan*, 1997; *Http://www.srs.gov/general/srenviro/srfs/srfs.htm.* U. S. Forest Service, Savannah River Operations Office, April 6, 2000; *Land Reserves Created at Departmental Sites*, DOE This Month, August 1999.

As DOE moves forward with long-term stewardship, DOE will need to continue to build upon its existing partnerships with other federal agencies, Tribes, states, and local governments. All parties must share a common understanding of the nature of the residual hazards at DOE sites, the need for continued implementation of long-term stewardship activities, and the need for

[29]Certain states (e.g., Tennessee, Washington) have state regulations pertaining to land use planning. Tribal nations also have regulations governing land use and planning. For example, the Yakama Nation has promulgated regulations to encourage appropriate use of the land; to protect the social and economic stability of residential, agricultural, commercial, industrial, forest, reserved and other areas within the reservation; to assure orderly development of such areas; and to otherwise promote the public health, safety, morals and general welfare in accordance with the rights by the Yakama Indian Nation in the 1855 *Treaty with the Yakamas* (12 Stat. 951). Additional information on these regulations is available at *http://wolfenet.com/~yingis/*.

continued restrictions on land and resource use. These partnerships will require continuing open communication, information exchange, and coordinated planning to develop solutions.

4.2.4 Research & Development

The need for long-term stewardship reflects the inadequacy of existing cleanup technologies. For example, the National Research Council noted that "although considerable effort has been invested in groundwater and soil cleanup, the technologies available for these cleanups are relatively rudimentary,"[30] and recently reaffirmed its support for greater investment in science and technology.[31] In addition, a recent audit report by the DOE Office of Inspector General found that:

> "The Department's groundwater monitoring activities were not being conducted as economically as they could have been since some sites had not adopted innovative technologies and approaches to well installation, sampling operations, and laboratory analysis. This occurred in part because innovative groundwater monitoring techniques adopted by some sites had not been effectively disseminated, evaluated for applicability at other sites, and implemented."[32]

In response, the Secretary of Energy directed EH to be the lead office to improve the consistency and quality of ground water monitoring and reporting.[33]

The majority of the EM program's science and technology development effort is focused on supporting near- and mid-term objectives, not long-term stewardship. Given the number of sites expected to require long-term stewardship by DOE, initial estimates suggest the annual cost of long-term stewardship will be in excess of $70 million in FY 2006. Environmental sampling and analysis is anticipated to be a significant long-term stewardship cost. For example, analysis of a single groundwater sample for volatile and semivolatile organic compounds and metals may cost $1,000 or more. Therefore, the Department invests in science and technology in order to improve the permanence of the cleanup remedies and reduce the monitoring and maintenance costs while maintaining or improving protection of human health and the environment.

DOE has initiated an effort to make investments in science and technology that will result in significant reductions in the risk, cost, and duration of long-term stewardship. DOE has identified the Idaho National Engineering and Environmental Laboratory (INEEL) as the lead laboratory for coordinating science and technology development related to long-term stewardship, but the Department expects significant participation from the other national laboratories, industry, and academic centers currently involved in EM science and technology

---

[30] *Innovation in Ground Water and Soil Clean up: From Concept to Commercialization*. National Research Council, Washington, D.C. National Academy Press, 1997.

[31] *Natural Attenuation in Ground Water. Re-dedication and Research Needs in Subsurface Science*. National Research Council, Washington, D.C. National Academy Press, March 2000.

[32] *Groundwater Monitoring Activities at Department of Energy Facilities.* U.S. Department of Energy, Office of Inspector General, Office of Audit Services. DOE/IG-0461, February 2000.

[33] Memo: Departmental Position on the Office of Inspector General Report IG-0461, "Ground Water Monitoring Activities at Department of Energy Facilities." To: Phillip L. Holbrook, Deputy Inspector General for Audit Services.

development efforts. DOE is developing planning documentation for a long-term stewardship science and technology "roadmap" that will (1) identify new science and technology needs specific to long-term stewardship; (2) identify existing capabilities to meet these needs both within and external to DOE; (3) determine critical research and development priorities; and (4) direct specific efforts to meet these needs. A preliminary roadmap is anticipated by September, 2000; however, the Department intends to use an iterative process to identify and address science and technology needs as the scope of long-term stewardship becomes more certain.

Scope of Long-term Surveillance and Monitoring at DOE Sites

Current estimates indicate that approximately 548,000 acres of land currently are or eventually are expected to require long-term stewardship by DOE. DOE's long-term stewardship activities will include maintaining controls and/or monitoring for:

- Contaminated groundwater at 80 sites.
- Vaults, tank farms, and/or radioactive, hazardous, or sanitary landfills at 63 sites.
- Contaminated soils at 25 sites.
- Contaminated facilities at 13 sites.
- Contaminated surface water or sediment at nine sites.

Initial activities are focused on identifying current needs and capabilities, performing gap analyses, and developing an approach for meeting high priority needs. Because many science and technology investments that already have been made (e.g., more durable caps and covers; real-time monitoring equipment) can be deployed now to support long-term stewardship activities today, adapting available technologies to long-term stewardship is a high priority. For the same reason, certain long-term stewardship needs (e.g., information management) are not addressed within existing DOE research and development efforts. Over time, it will be necessary to continually re-assess science and technology needs as the longer-term EM projects begin to reach completion and additional information is learned at sites.

Science and Technology Investments for Long-term Stewardship

Two types of information are necessary to fully understand long-term stewardship science and technology needs: (1) the end states to be achieved by EM projects; and (2) the resulting technical baselines for long-term stewardship, including the scope of activities, schedule, and cost estimates. Once the end states and baselines are known, it is then possible to identify opportunities for new science and technology to improve reliability and reduce costs. Based on current understanding, DOE has developed a preliminary list of science and technology needs:

- Information about durability of materials, and more durable materials - capping/barrier materials (e.g., clay, geotextile, plastic, rock), waste containers and waste forms.
- Knowledge of fate and transport mechanisms and predictive capabilities.
- Monitoring and surveillance methods (e.g., methods of detection, analysis, remote sensing and data transmission).
- Information management - methods for identifying, recording, storing, archiving, and accessing relevant and necessary information for future site stewards and land/facility users.
- Support systems - renewable energy systems (e.g., geothermal heat pumps, solar photovoltaic systems) that can reduce the costs and improve the reliability of pump-and-treat and monitoring systems.
- Improved systems engineering and design needed to ensure that, before new facilities are built and operated, requirements for D&D and waste disposition are considered carefully.

Although this preliminary list provides a starting point for science and technology development efforts, a reliable list awaits completion of more long-term stewardship baselines and plans.

4.3 How will Long-term Stewardship be Managed at Sites with Ongoing Missions other than Cleanup?

DOE has organized its mission areas into the following categories: national security, science and technology, energy security, and environmental quality. Some DOE sites have multiple, ongoing missions, are being cleaned up by EM, and are performing long-term stewardship in portions of the site. DOE also has begun to promote private redevelopment at certain sites (e.g., Mound, Hanford, Oak Ridge). The EM program currently is responsible for long-term stewardship at 21 sites engaged in continuing DOE missions other than cleanup (see EM Program Text Box below). At these 21 sites, the Department had not clarified which Program Office would be responsible for long-term stewardship after EM cleanup work is complete. The Department is now developing an explicit policy to articulate which DOE Program Office is responsible for long-term stewardship at these 21 sites following the completion of EM cleanup activities.

Multi-Program Long-term Environmental Stewardship Work Group

In 1999, DOE convened a multi-program working group to identify and analyze the issues associated with long-term stewardship at sites with continuing non-EM operations. The Work Group included representatives from the Office of Defense Programs, the Office of Environmental Management, and the Office of Science. The issues were developed through a series of conference calls, a face-to-face meeting, and analysis of relevant case studies. The Work Group recommendations have led to a draft DOE policy assigning long-term stewardship responsibility at sites engaged at continuing DOE missions other than cleanup. The draft policy is currently being reviewed by DOE managers.

Source: Discussion Paper on Long-term Environmental Stewardship Responsibilities at Sites with Continuing Non-Environmental Management Operations. U.S. Department of Energy, Multi-program Long-term Environmental Stewardship (LTES) Work Group, Spring 2000.

Two general program succession paths for these sites are anticipated:

- **EM may transfer long-term stewardship responsibility to the DOE program(s) responsible for the ongoing mission(s)**. This option would allow for better planning and efficiency on a site-specific basis. However, there may be lower priority for funding and implementing long-term stewardship activities at the site than for activities directly related to other ongoing site missions. This may be particularly the case if the long-term stewardship activities represent a small part of the overall mission of the site and do not have a strong regulatory driver. Also, this option would establish long-term stewardship as a responsibility for multiple organizations within DOE. This may result in duplication of effort and actually reduce opportunities for planning and efficiency on a complex-wide basis.

- **EM (or a successor organization) may take responsibility for long-term stewardship at the site**. This option would have the advantage of consolidating long-term stewardship responsibility and expertise within a single management organization that already is focused on long-term stewardship planning and implementation. However, the division of responsibilities for a site reduces accountability of the individual Program Office, and implementation could be complicated if responsibilities for specific activities (e.g., provision of site security) overlap or are unclear. For example, the recent creation of the NNSA, with independent lines of authority within DOE, may pose additional challenges to the implementation of long-term stewardship at sites where NNSA is the landlord.

DOE will need to resolve these issues and develop a process for deciding which program succession path makes most sense, either programmatically or at a given site.

The program succession path for a site may be particularly uncertain when decisions regarding future missions are pending and/or when DOE and local communities are interested in economic re-development of the site. Establishing organizational responsibilities, sources of funding, and other mechanisms for managing long-term stewardship at the site will be difficult until the nature and scope of future site missions become clearly established.

The EM Program is Currently Responsible for Long-term Stewardship at 21 Sites with Continuing, non-EM Missions

Since 1989, the EM program has had the primary responsibility for planning, funding, and conducting cleanup and long-term stewardship at all DOE sites. This responsibility currently includes 21 sites with continuing, non-EM missions. At these sites, another Principal Secretarial Officer (PSO) has general management and direction (landlord) responsibility:

NNSA Office of Defense Programs
- Kansas City Plant
- Los Alamos National Laboratory
- Lawrence Livermore National Laboratory – Main Site
- Lawrence Livermore National Laboratory – Site 300
- Nevada Test Site
- Pantex Plant
- Sandia National Laboratory – California
- Sandia National Laboratory – New Mexico
- Savannah River Site[1]
- Y-12 Plant (Oak Ridge Reservation)

Office of Nuclear Energy, Science, and Technology
- Argonne National Laboratory – West

Office of Science
- Ames Laboratory
- Argonne National Laboratory – East
- Brookhaven National Laboratory
- Fermi National Accelerator Laboratory
- Lawrence Berkeley National Laboratory
- Oak Ridge Institute for Science and Education
- Oak Ridge National Laboratory
- Princeton Plasma Physics Laboratory
- Pacific Northwest National Laboratory
- Stanford Linear Accelerator

[1]The EM Program is the current landlord at the Savannah River Site

Chapter 5: Hazard Management

A key element of long-term stewardship will involve containing and preventing access to residual site hazards. Hazard management will involve the operation, maintenance, and periodic replacement of active and passive control mechanisms (e.g., treatment systems, access restrictions, warning signs) as well as contingency systems for addressing unexpected failures of control mechanisms or newly discovered environmental problems.[34] This chapter describes the types of active and passive controls that are used to manage residual hazards. This chapter also describes how long-term stewardship is affected by current practices and presents alternatives for addressing uncertainty and contingency planning during long-term stewardship.

APPLICABLE SCOPING COMMENTS
(see Exhibit 2 in Appendix B)

- DOE should evaluate the reliability of institutional controls over extended periods of time, adopt redundant, overlapping functions to ensure efficacy of control measures, and recommend methods to prevent or minimize future failures (1, 4, 10)
- Every long-term stewardship plan should have an emergency response contingency plan to address potential failures of controls (7)
- The study should address the relative roles of active vs. passive controls with guidance on determining the length of time of active controls (2, 8)
- Long-term stewardship should be expected to fail. DOE should plan for and consider the consequences of failure (18)

APPLICABLE ISSUES
(see Exhibit 3 in Appendix B)

2. *Development of Site-specific Long-term Stewardship Plans*
8. *Institutional Controls*
12. *Risk Management*
25. *Minimize Risks/Hazards and Plan for Failures*

5.1 Engineered and Institutional Controls

At sites where cleanup to levels appropriate for unrestricted use cannot be achieved, two general types of long-term controls are used to protect human health and the environment: engineered controls and institutional controls.[35] As noted in Chapter 3, these controls are established during the site cleanup process. Both types of controls are intended to block exposure pathways (Exhibit 5-1):

- ***Engineered controls*** include actions implemented to stabilize and/or physically contain or isolate waste, contamination, or other residual hazards. They are used to prevent residual hazards from migrating in the environment and reaching human and environmental receptors. Engineered controls include in-situ stabilization; caps on residual contamination; and vaults, repositories, or engineered landfills designed to isolate waste or materials.

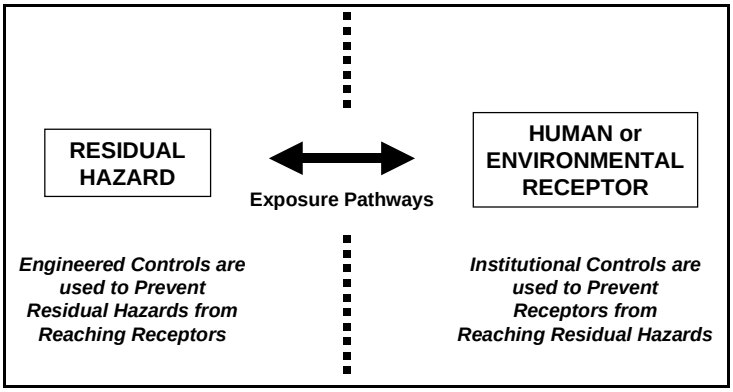
- ***Institutional controls*** are legal and other non-engineering measures intended to affect human activities in such a way as to prevent receptors from reaching residual hazards. Institutional

[34] *RCRA Closure and Post-Closure Plans*, U.S. Department of Energy, Office of Environmental Guidance, RCRA Information Brief. DOE/EH -231-009/1291, December 1991; *Planning and Implementing RCRA/CERCLA Closure and Post-Closure Care When Wastes Remain Onsite*. U.S. Department of Energy, Office of Environmental Policy and Assistance, RCRA/CERCLA Information Brief. DOE/EH-413-9910, October 1999.

[35] Other terminology has been used to describe the types of controls involved in long-term stewardship. For example, EPA regulations (40 CFR Part 191) define the term "institutional controls" to broadly encompass all long-term stewardship activities, and divides activities into 'active' vs. 'passive' controls.

controls include land and resource management, deed restrictions, well-drilling prohibitions, building permits, hunting licenses or permits, physical measures such as markers, and facility security. For purposes of this *Draft Study*, they may be divided into nine categories (Exhibit 5-2).

Exhibit 5-1. Use of Engineered and Institutional Controls to Manage Residual Hazards



For long-term stewardship to be successful, both engineered and institutional controls must remain effective until the residual hazards have diminished to the point that unrestricted use is permitted. The National Contingency Plan under CERCLA, RCRA regulations, and NRC regulations all consider the use of institutional controls as a supplement to the use of engineered controls as appropriate for short- and long-term management to prevent or limit exposure to residual hazards.[36]

5.2 Long-term Monitoring and Maintenance of Engineered Controls

Any engineered control system will require inspection and periodic maintenance to ensure continued performance. Engineered control systems, such as surface covers, subsurface barriers, and landfill caps and their components, have finite design lives. These systems are expected to fail at some point in time – although the effective design life of an engineered control can be extended with long-term inspection and routine maintenance[37] – and DOE sites are required to develop a maintenance plan for DOE property, including all engineered controls.[38] The effective design life of an engineered control, and the associated inspection and maintenance requirements, depend upon the characteristics of the system, such as:

[36]CERCLA: 40 CFR Part 300.430 (a)(1)(iii)(D)6; RCRA: 61 FR 19448 (May 1, 1996); NRC: 10 CFR Part 20.1402.

[37]*Evaluation of Subsurface Engineered Barriers at Waste Sites*. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington D.C. EPA 542-R-98-005, August 1998, page 18.

[38]DOE Order 4330.4B, Maintenance Management Program. Note that the Order does not explicitly require a "replacement plan" for property such as engineered controls, although such a requirement may be inferred.

Exhibit 5-2. Examples of Institutional Controls

- *Easement* – A legal mechanism creating a limited interest in land belonging to another person (a positive easement), such as an easement granting access to conduct groundwater monitoring; or a limitation on the rights of the owner of the land (a negative easement), such as a prohibition on construction of housing.
- *Deed Notification* – A description in a property deed that conveys information about the property to future buyers (e.g., a notice that hazardous materials have been placed in a landfill on the property).
- *Deed Restriction* – A provision in a deed prohibiting certain uses of the property (e.g., a covenant that the property may never be used for housing). Certain deed restrictions may be enforceable through *reversion clauses*, which allow the former property owner (i.e., the federal government) to take back ownership of the property if terms of the deed restrictions are not followed.
- *Lease* – A document that outlines and restricts the conditions for temporary use of a property.
- *Covenant* – A promise by one landowner to another made in connection with a conveyance of property to use or refrain from using the property in a certain manner. Generally, covenants may be binding on subsequent landowners (i.e., "run with the land") if: (1) notice is given to the subsequent landowner, (2) there is a clear statement of intent to bind future owners, (3) the agreement "touches and concerns" the land, and (4) there is vertical and horizontal privity between the parties.
- *Permit* – A document that authorizes or prohibits certain land use activities (e.g., a building permit or a permit to withdraw groundwater) through approval by the appropriate federal, local, or state government entity. Permits do not affect property rights.
- *Zoning* – Police power used by local governments to regulate or control the use of property by specifying zones or districts within which only specified uses or types of construction may occur as a means to implement a master plan.
- *Sign* – A marker that conveys messages regarding property and its use restrictions.
- *Fence* – A fixed structure used as a boundary or barrier to physical access.

- A groundwater pumping system is designed to prevent migration of contaminated groundwater. It will require operation of groundwater pumps and possibly a groundwater treatment system. Such a system, involving powered equipment having moving parts and exposed to weather, will require frequent inspection and maintenance in order to guard against events such as power failure, plugging of system piping, blockage of wells, frost damage, corrosion, and other pump failure mechanisms. Active systems cannot be neglected for even a few months without risk of failure. Even with rigorous routine inspection and maintenance, powered equipment such as groundwater pumps are not expected to last for many years without requiring repair or replacement.

- A subsurface engineered barrier is designed to prevent migration of subsurface contamination. It is a static system that does not require direct human intervention in order to function. However, a subsurface barrier system requires periodic monitoring to ensure that it continues to function as designed, and requires maintenance or replacement in the event that its performance degrades. A recent study of 36 subsurface engineered barrier systems found

few data available to assess their actual functional life and failure modes.[39] In contrast to active pumping systems, where groundwater monitoring data are typically collected quarterly or monthly to ensure that residual hazards are contained, essentially no post-construction monitoring is being performed on these systems to identify long-term environmental degradation mechanisms.[40] In addition, the industry baseline standard for subsurface barrier systems is that no post-construction monitoring is performed.[41]

- High Density Polyethylene (HDPE) is used in the construction of landfill liners and subsurface vertical barriers. The long-term durability of HDPE is not known, as the material has only been in use in liner and barrier system applications for several decades. HDPE is anticipated to have a design life in excess of 300 years based on available information, but the factors that may influence HDPE degradation are still being studied.[42]

- Surface covers for byproduct material and other radioactive waste (e.g., uranium mill tailings cell caps) are required by regulation to be designed to last for at least 200 to more than 1,000 years. Such performance requirements are unprecedented and there are no direct methods of predicting surface cover performance over such time frames. Potential surface cover failure mechanisms include water infiltration, frost penetration, erosion, and plant and animal intrusion.[43]

Long-term stewardship of uranium mill tailings surface covers, including surveillance and maintenance, is currently being conducted by DOE to assess, prevent, and mitigate effects of potential failures such as erosion and biological intrusion. Even assuming rigorous long-term surveillance and maintenance is conducted, performance of these surface covers over the time frames they are required can only be predicted, not demonstrated.

To address the uncertainties in surface cover performance over long periods of time, DOE Order 435.1, Radioactive Waste Management, requires DOE to develop a performance assessment (PA) and composite analysis (CA) for each low-level waste disposal facility.[44] The PA is an analysis of the expected future radiological exposure resulting from the waste disposed in the facility. The CA is a similar analysis that accounts for not only the radioactivity in the disposal facility, but all other sources of radioactivity at the site that could contribute to an overall exposure should a failure occur.

---

[39]*Evaluation of Subsurface Engineered Barriers at Waste Sites,* U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington D.C., EPA 542-R-98-005, August 1998, page 78.

[40]*Ibid*, page 12.

[41]*Ibid*, page 55.

[42]*Subsurface Containment and Monitoring Systems: Barriers and Beyond - Overview Report.* U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Technology Innovation Office, Washington D.C., March 1999, page 18.

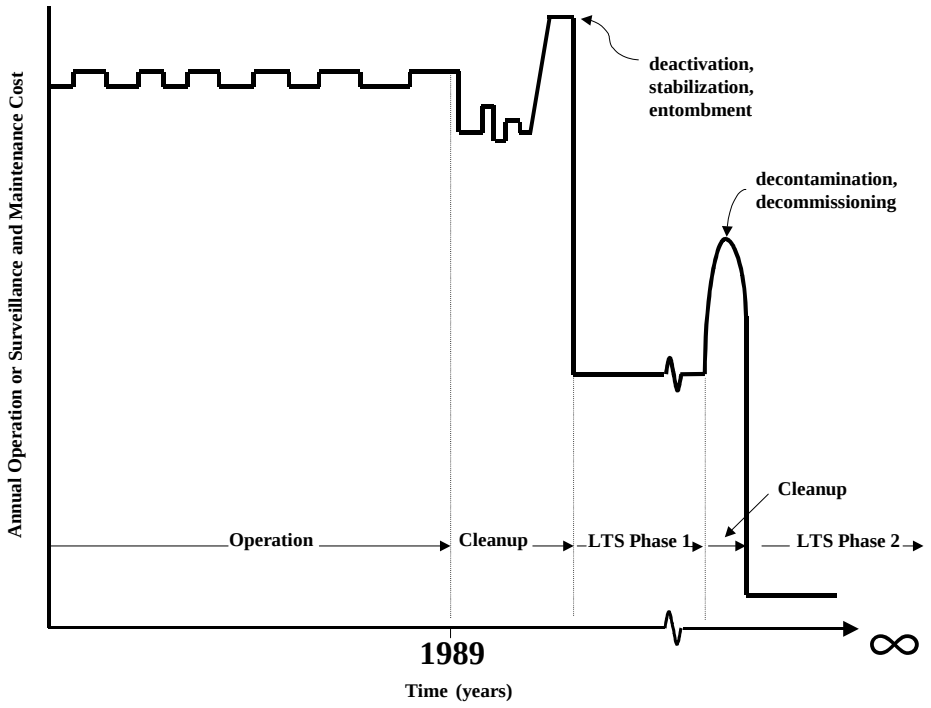
[43]Waugh, W.J. et. al., 1995. Natural Analogs of the Long-term Performance of Engineered Covers. *Thirty-Third Hanford Symposium on Health and the Environment. In Situ Remediation: Scientific Basis for Current and Future Technologies, Part I.*; Waugh, W.J., and Richardson, G. N., 1995b. Ecology, Design, and Long-term Performance of Waste-Site Covers: Applications at a Uranium Mill Tailings Site. *National Academy of Sciences Workshop on Barriers for Long-term Isolation, Denver Colorado,* August 13, 1995.

[44]DOE Order 435.1, *Radioactive Waste Management*, July 9, 1999. Available at: *http//www.explorer.doe.gov:1776/htmls/currentdir.html.*

The distinction between operation and maintenance during cleanup and long-term stewardship is not clearly defined. Many activities that are considered part of an ongoing cleanup project could be classified as part of long-term stewardship (see Exhibit 5-3).

Exhibit 5-3. When Does Long-term Stewardship Begin?

Long-term stewardship generally begins when active cleanup, stabilization, or disposal has been completed in accordance with an applicable regulatory requirement or management plan. In some cases, particularly at the large, complex sites, the cleanup plan addresses an entire geographic site; in other cases, long-term stewardship may occur at a portion of a site long before cleanup of the entire site is completed. For many sites and facilities, there also are two phases to performing long-term stewardship. In most cases, "terminal" long-term stewardship begins when cleanup of a site or portion of a site has been cleaned up to the agreed-upon end state. For some



facilities – particularly reactors and large processing canyons – an initial "interim" phase of long-term stewardship is needed after a facility has been stabilized, but where further remedial action or decontamination and decommissioning is not expected to occur for a significant period of time after the stabilization is completed. The above exhibit illustrates the relative timing of the two phases of long-term stewardship. The exhibit illustrates a hypothetical cost profile for a large facility that operated for several years, underwent initial deactivation and stabilization, and was entombed for several decades while a final disposition strategy was determined (e.g., original reactors and the PUREX Plant at Hanford). After several decades, the facility underwent final decontamination and decommissioning. The activities that occurred during the period of entombment could be defined as the interim phase (phase 1) of long-term stewardship. Once decontamination and decommissioning are complete, the facility would be considered in the terminal phase (phase 2) of long-term stewardship. The interim phase of long-term stewardship was identified specifically in the FY 2000 National Defense Authorization Act report language that requested the *Report to Congress*:

> *"The report shall ... identify the long-term stewardship responsibilities (for example, longer than 30 years) ... for ... portions of sites for which ... facility stabilization is expected to be completed by the end of calendar year 2006."*

5.3 Long-term Maintenance of Institutional Controls

DOE and its predecessor agencies have been maintaining institutional controls over site hazards for decades. However, many institutional controls assumed continued federal ownership of the property in perpetuity. While government ownership and control is a central component of the legislation creating the Waste Isolation Pilot Plant (WIPP) repository[45] (i.e., the WIPP Land Withdrawal Act), DOE planning at some sites must now consider the possibility that the site will no longer have an ongoing mission other than long-term stewardship, and parcels of the site may not need to remain federal property (see Chapter 4). In addition, DOE is now conducting cleanup and long-term stewardship at sites not owned or controlled by the Department. State, local, and Tribal governments already have a primary role in the maintenance of many institutional controls, and this role may grow as parcels of land are transferred from federal control. Over time, a given parcel of land may cycle again and again between multiple missions and may change ownership many times, creating additional challenges for the maintenance of institutional controls.

Affected Parties Are Critical Long-term Stewardship Partners

At most sites, the roles and responsibilities of local governments for implementing and overseeing long-term stewardship activities remain to be defined explicitly. Local governments already have a primary role in the maintenance of many institutional controls, including preserving easements, deed restrictions, and parcel maps; implementing groundwater use controls; and issuing zoning approvals and building permits. Local governments have primary responsibility for land use planning and also maintain emergency response capabilities (e.g., fire, rescue). Where parcels of land have been transferred or leased to local governments (e.g., Hanford, Mound, Pinellas), local governments have assumed additional responsibilities such as ensuring that re-use of site facilities and infrastructure is consistent with restrictions necessary to protect human health and the environment. Local governments also may assume a more prominent role in managing long-term stewardship information and in promoting education and training to ensure the continuity of long-term stewardship across multiple generations. The draft long-term stewardship plan for the Weldon Spring Site in Missouri[1] identifies the local government as an "oversight steward" for the site. The draft plan also identifies specific roles and responsibilities for the local government, including a primary role in planning, zoning, and enforcing institutional controls such as groundwater use restrictions.

[1]*Stewardship Plan for the Weldon Spring Site, Revision A, April 1999*. Weldon Spring Site Remedial Action Project. DOE/OR/21548-771, April 1999.

[45]The Waste Isolation Pilot Plant (WIPP) is the world's first underground repository licensed to safely and permanently dispose of transuranic radioactive waste left from the research and production of nuclear weapons. After more than 20 years of scientific study, public input, and regulatory struggles, WIPP began operations on March 26, 1999. Located in the remote Chihuahuan Desert of Southeastern New Mexico, project facilities include disposal rooms mined 2,150 feet underground in a 2,000-foot thick salt formation that has been stable for more than 200 million years. Transuranic waste is currently stored at 23 locations nationwide. Over the next 35 years, WIPP is expected to receive about 37,000 shipments. *Source*: *http://www.wipp.carlsbad.nm.us/*

Both DOE and EPA Regions have developed guidance on the selection and enforcement of institutional controls when residual hazards remain onsite.[46] DOE also has enforced easements and other restrictions in the course of mission-related activities. For example, Oak Ridge Operations Office transferred land to a local community with deed restrictions that included a prohibition on the use of groundwater because DOE did not know whether a contaminant plume might eventually migrate to the area. DOE did not conduct regular monitoring to ensure the deed restriction was being enforced, and accidentally discovered that the community later drilled groundwater wells to irrigate a golf course. DOE met with the community, mandated immediate removal of the wells, and threatened that the land would revert to DOE. The community complied.[47] Other sites have obtained easements for access to off-site property to conduct monitoring activities or to build and maintain utility rights of way or infrastructure. DOE also has some experience maintaining institutional controls after real property transfer (see Chapter 6).

Institutional controls can be used individually or in combination (referred to as "layering"), depending on the legal status of the property and the nature and extent of residual hazards on the property. "Layering" of institutional controls should be able to increase protectiveness. All may be used on any DOE property; however, deed restrictions, and zoning are only relevant for sites where the federal government (e.g., DOE) will *not* retain ownership of the land (such as when land is transferred to non-federal entities pursuant to CERCLA §120(h)).[48] Under some circumstances, it may be important to consider the use of institutional controls for off-site areas adjacent to DOE sites (e.g., as buffer zones for residual hazards onsite).

The temporary failure of institutional controls at Oak Ridge noted above suggests that enforcement of institutional controls for the extended periods of time involved in long-term stewardship will require new oversight systems, especially procedures for monitoring compliance with institutional controls after land transfers have occurred. If such a failure can occur at an active site, where affected parties are exceptionally knowledgeable about site hazards, EM program activities, and long-term stewardship issues, it is reasonable to anticipate similar failures at other sites if monitoring and oversight is not maintained. DOE has in place formal procedures and directives that establish programmatic responsibilities to enforce institutional controls, and the Office of Long Term Stewardship will work with other programs to develop and implement "layering" strategies and contingency plans to address potential or actual failures.

---

[46] *RCRA Closure and Post-Closure Plans*, U.S. Department of Energy, Office of Environmental Guidance, RCRA Information Brief. DOE/E -231-009/1291, December 1991. *Planning and Implementing RCRA/CERCLA Closure and Post-Closure Care When Wastes Remain Onsite*. U.S. Department of Energy, Office of Environmental Policy and Assistance, RCRA/CERCLA Information Brief. DOE/EH-413-9910, October 1999. *Use of Institutional Controls in the RCRA Corrective Action Program*, U.S. Environmental Protection Agency, Region 5, March 2000.

[47] *DOE Long-term Stewardship -- Real Estate Issues*, U.S. Department of Energy, Office of Environmental Management, Office of Long Term Stewardship, January 10, 2000.

[48] A land transfer from the federal government to a non-federal entity is necessary to create the deed restriction in the first place, because transfers within the federal government would not result in the creation of a deed. Local governments cannot enforce zoning restrictions on the federal government.

The long-term effectiveness of institutional controls is a much-debated topic, although there is little historical precedent or empirical information upon which judgments can be based.[49] Some studies have estimated the probability of human intrusion into waste disposal cells under different scenarios.[50] There are inherent obstacles to the long-term effectiveness of every common type of institutional control (Exhibit 5-4). Over time, the sustainability of institutional controls may be affected by changes in real property law, which already varies from state to state; socioeconomic developments affecting land use; and the potential information loss that will accompany multiple changes in land ownership. DOE will need to expand its focus beyond

Exhibit 5-4. Obstacles to the Long-term Effectiveness of Common Institutional Controls

Deed Notices	• Over time, deed records may be destroyed, lost, or corrupted • New property owners may not search the deed records adequately or may miss the deed notice • New owners who receive property by gift or inheritance may not review the deed records • Transfers of land among federal agencies may not generate deeds on which to place notices • New deeds that do not include the restriction may be created legally after certain transfers • Some states have enacted statutes that extinguish deed notices if the deed is not re-recorded after a certain period of time
Deed Restrictions	• Enforceability of deed restrictions is being eroded by changes in state laws • Deed restrictions frequently cannot be enforced by anyone except landowners who share a chain of title with the restricted parcel • Deed restrictions frequently cannot be enforced against anyone who does not have legal notice of the restriction
Negative Easements	• Prohibitions on the use of property, such as negative easements for lesser requirements, are disfavored and may be overturned by courts or legislatures • State laws allowing negative easements for conservation or historic preservation need to be broadly interpreted to cover long-term stewardship needs • DOE, as the transferor of real property covered by an easement, would be the only party that could enforce the easement; enforcement could not be transferred or delegated to a Tribal, state, local, or private party
Zoning	• Local zoning ordinances are probably not enforceable against federal agencies if the agency asserts sovereign immunity • State law creating local zoning authority may change over time • Local zoning ordinances may be amended or repealed • Local governments may not enforce zoning restrictions

Source: Applegate, J.S., and Dycus, S. Institutional Controls or Emperor's Clothes? Long-term Stewardship of the Nuclear Weapons Complex. *Environmental Law Reporter*, November 1998; Pendergas, J., Use of Institutional Controls as Part of a Superfund Remedy: Lessons from Other Programs. *Environmental Law Reporter*, March 1996.

[49]English, M., Feldman, D, Inerfeld, R. and Lumley, J, "Institutional Controls at Superfund Sites: A Preliminary Assessment of Their Efficacy and Public Acceptability." July 1997. This report summarizes much of the recent research on institutional controls. The Environmental Law Institute is conducting extensive case studies on the topic at numerous sites, including DOE sites.

[50]Black, P., et al. A Common-Sense Probabilistic Approach to Assessing Inadvertent Human Intrusion into Low-level Radioactive Waste at the Nevada Test Site. *Paper presented at Waste Management 2000*, Tucson AZ.

enforcing land use restrictions and other institutional controls within site boundaries. The Department needs to continue to coordinate with Tribal, state, and local authorities responsible for enforcing institutional controls in the surrounding communities. Where property transfers or leases have occurred, it may be necessary for DOE to actively monitor compliance with existing institutional controls and take steps to enforce, extend, or replace them when necessary. This may require new procedures, funding, and authority. For transfers within the federal government, DOE may need to enter into specific agreements with the receiving agency to ensure continued enforcement of institutional controls.

Other federal agencies have encountered situations in which failure or intentional breaching of institutional controls has had significant consequences. The Bureau of Land Management (BLM) implements institutional controls such as warning signs, fences and steel gratings to protect people from risks associated with abandoned mine sites under their jurisdiction. These institutional controls are often torn down or intentionally breached. For example, BLM reported in a recent internal agency advisory that two men in Virginia City, Nevada breached a fence in order to explore a closed mine. The men were later discovered within 75 feet of the mine entrance, asphyxiated. BLM reported that they died of carbon dioxide poisoning.[51] In this case, BLM retained ownership of the abandoned mine site but did not implement active control over human access to the site. Human intrusion scenarios are less likely to occur in cases where site access controls include "layering" of multiple institutional control mechanisms and active management of the site. Both EPA and other federal agencies managing sites containing residual hazards have recommended layering of institutional controls.[52]

"Layering" of Institutional Controls at Department of Defense Sites

The U.S. Air Force and EPA have agreed to use layering of notices, deed restrictions, permit approvals, and access rights to limit subsurface use at former Minuteman Missile Silo sites in North Dakota, South Dakota, and Minnesota. The concrete silos were dismantled by imploding the structures and capturing contamination within the concrete structures. Each structure was capped with three feet of soil and a plastic liner, and the landscape was contoured with an additional seven feet above the buried structure. The silo site properties may be transferred to non-federal entities under CERCLA §120(h). The agreement calls for the General Services Administration (GSA) to be involved in any property disposal and for GSA to notify federal and state regulators when the property is transferred. GSA is also to provide prior notice of and obtain approval of federal and state regulators for any construction or other activity on the sites that would affect buried structures or groundwater monitoring wells. GSA also is required to place restrictions in the deed of conveyance to prohibit future property owners from installing water wells or otherwise penetrating the surface of the site to a depth of more than two feet. Both the U.S. Air Force and federal and state regulators retain rights of access to the sites under any transfer agreement.

Source: *Institutional Controls: What They Are and How They Are Used*. U.S. Department of Defense, Office of the Deputy Under Secretary of Defense, Environmental Security, Base Realignment and Closure (BRAC) Environmental Program Fact Sheet. Spring, 1997.

[51]U.S. Department of Interior, Bureau of Land Management, BLM Internal Advisory, Nevada *http://www.blm.gov/narsc/aml/hazards2.htm#top*

[52]*A Guide to Establishing Institutional Controls at Closing Military Installations*, U.S. Department of Defense, February 1998.

A report by the International City/County Management Association, based on a survey of state and local government officials, points out the importance of working closely with local governments and the need to increase their level of expertise with respect to institutional controls. The study concludes that nearly 75 percent of local government respondents presently do not have experience implementing institutional controls at former hazardous waste sites (probably the closest analog to DOE sites released for restricted use). The respondents reported minimal efforts to enforce controls, and reliance on institutional memory, citizen complaints, and informal inspections as triggers for the majority of enforcement efforts. The study also notes that over 60 percent of respondents believed that it was "likely" or "highly likely" that institutional controls could be breached without the knowledge of the implementing local government.[53] According to a recent case study, if the public perceives a substantial residual risk, there is increased public acceptance of institutional controls and greater public cooperation in implementing the controls.[54] These studies emphasize the importance of continuing to maintain and enhance partnerships between DOE and local communities to maintain the continued effectiveness of institutional controls.

Given the uncertainty associated with the long-term effectiveness of institutional controls, DOE may need to investigate new approaches for ensuring the protectiveness and effectiveness of institutional controls. This research would be in addition to existing efforts to develop new science and technology to increase the protectiveness and effectiveness of engineered controls.

5.4 Identifying Uncertainty and Contingency Planning

DOE currently considers the long-term implications of each proposed remedy during the remedy selection process, and DOE has developed guidance on the use of conceptual site models and uncertainty management matrices to assist with contingency planning during cleanup.[55] However, uncertainties exist for long-term performance of cleanup remedies. It therefore is not possible to fully understand their long-term viability, cost, or reliability.[56] Engineered and institutional controls are selected and implemented based on an understanding of current site conditions.[57] However, site conditions, as well as changes in social and economic values, regulatory standards, etc., may differ from those assumed or may change with time. Major

---

[53]Gaspar, C. and VanBurik, D., *Local Government Use of Institutional Controls at Contaminated Sites*. International City/County Management Association, April 1998. Of particular interest is the fact that although the respondents reported that traditional zoning (56%) and groundwater restrictions (26%), both types of institutional controls generally implemented by local governments, were the most common controls, they also reported low levels of enforcement and high likelihood the controls would be breached.

[54]*Institutional Controls Case Study: Grand Junction*. Environmental Law Institute, Research Report, 1999.

[55]*Assessment of Short-term and Long-term Risks for Remedy Selection*. U.S. Department of Energy, Office of Environmental Policy and Assistance, CERCLA Information Brief. DOE/EH-413/9708, August 1997; *Uncertainty Management: Expediting Cleanup Through Contingency Planning* U.S. Department of Energy, Office of Environmental Management and Office of Environment, Safety and Health, U.S. Environmental Protection Agency, DOE/EH/(CERCLA)-002, February 1997; *Planning and Implementing RCRA/CERCLA Closure and Post-Closure Care When Wastes Remain Onsite*. U.S. Department of Energy, Office of Environmental Policy and Assistance, RCRA/CERCLA Information Brief. DOE/EH-413-9910, October 1999.

[56]*Standards for Remedial Actions at Inactive Uranium Processing Sites*. 48 FR 590, 597, January 5, 1983.

[57]*Development of Remediation Goals under CERCLA*, U.S. Department of Energy, Office of Environmental Policy and Assistance, CERCLA Information Brief. DOE/EH-413/9711, August 1997.

deviation from expected site conditions could result in unacceptable risks to human health and the environment. Therefore, DOE needs to develop the capability to identify, plan for, and respond to potential changes in site conditions and possible failures of engineered or institutional controls. This will require a dual capability to (a) identify and rapidly respond to actual or threatened failures of controls, and (b) monitor and respond to more gradual changes in regulations, site conditions, values, etc. to ensure the continued protectiveness of remedies.

5.4.1 Contingency Planning and Emergency Response During Long-term Stewardship

RCRA and CERCLA require DOE to respond to actual or threatened releases of hazardous substances that present an imminent and substantial threat to human health or the environment,[58] even for sites where remediation has been completed. Although monitoring the performance of remedies will be an important element of long-term stewardship, unexpected deviations or failures will occur – fences or other barriers may be breached, engineered controls may fail to contain contaminants or waste, or unknown sources of contamination may be discovered. Therefore, DOE needs to retain the capability to detect and respond to unexpected conditions, preferably before a release occurs.

Monitoring during long-term stewardship may identify conditions that indicate deterioration of the performance of the remedy or changes in site conditions that require corrective measures. Ideally, the long-term monitoring plan for a site should be designed to identify changing conditions at an early stage, before the protectiveness of the remedy is compromised. The monitoring plan should also include contingency plans to respond to the changes in conditions in order to maintain protectiveness. However, site stewards also need to recognize the need for emergency response when necessary. Emergency response activities may involve fire and rescue responses, responding to spills and other chemical or radionuclide releases, or responding to natural disasters such as earthquakes or tornados. Emergencies may directly involve residual hazards onsite (e.g., discovery of new contamination) or may involve such hazards indirectly (e.g., a fire may sweep across onsite areas containing radioactive or chemical hazards).

Many affected parties maintain emergency response capabilities; therefore, site stewards should coordinate emergency response training and contingency planning with appropriate state, local, and Tribal governments. It will be important to identify clear roles and responsibilities for specific responses (e.g., what actions are required, who does each action) and to conduct joint exercises to practice responses. Such coordination also should include coordinated special training for emergency response personnel to ensure they have the knowledge to respond to anticipated emergencies as well as avoid unnecessary risks from potential exposure to residual hazards. Emergency preparedness also will require appropriate up-to-date information about residual site hazards (e.g., fire fighters responding to a brush fire onsite would need to know the location(s) of residual site hazards and what types of personal protective equipment is necessary).

[58] 42 U.S.C. §6973(a), RCRA §7000(a).

5.4.2 Monitoring and Responding to Uncertainties During Long-term Stewardship

Environmental remediation is a relatively new field. There is little information on remedy performance over a 30-50 year time frame, and no information on remedy performance over very long periods of time (e.g., centuries). There also are no examples of past environmental remediation projects to provide a basis for evaluating uncertainties over very long periods of time (e.g., how land use changes have impacted remedies over the last two hundred years, or how accurate life-cycle cost estimating methodologies are). Hence, protectiveness may not be borne out over even moderate periods of time without continued monitoring of site conditions and remedy performance. An integral part of long-term stewardship activities, whether performed by DOE or other entities, is the need to improve knowledge and understanding related to:

- **The reliability, long-term effectiveness, and permanence of remedial actions**. One reason that monitoring is required is to ensure that implemented remedies are functioning as intended.

- **Natural processes and their interactions with hazards and remedies**. The natural processes at a site, and therefore geochemical interactions with residual hazards, may change over time. Climate changes can affect the performance of surface covers and other engineered structures. The understanding of these processes is not complete at this time. For example, the National Academy of Sciences recently reaffirmed the need for better science and technology with respect to natural attenuation processes.[59]

- **Exact extent and level of contamination**. The understanding of the extent and level of contamination is based on sampling and monitoring. Sampling presents an approximation of site characteristics. More sampling or continuous monitoring may provide better estimates of site characteristics over time. However, economic factors often limit the amount of sampling that can be conducted, and even unlimited sampling does not eliminate all uncertainties.

- **Land use**. Many remedial approaches rely upon restricted land use to ensure protection of human health and the environment. While it is feasible for decisionmakers to assume a particular land use in the near future, the long-term effectiveness of land use restrictions is uncertain (see above).

If adapted to long-term stewardship, two of DOE's existing tools for managing uncertainty during environmental cleanups – conceptual site models and uncertainty management matrices – could provide critical information needed for successful contingency planning.

- **Using Conceptual Site Models During Long-term Stewardship**. Conceptual Site Models (CSMs) are used during cleanup actions to depict the relationship between existing hazards, environmental transport mechanisms, exposure pathways, and ultimate human and ecological receptors. CSMs can also be used to distinguish between known and unknown site conditions (e.g., the existence of fractured bedrock or preferential pathways for groundwater

[59] *Natural Attenuation in Ground Water. Re-dedication and Research Needs in Subsurface Science*. National Research Council, Washington, D.C. National Academy Press, March 2000.

flow). While CSMs have traditionally been used for individual Operable Units or Areas of Concern, it may be possible to develop a long-term stewardship CSM for broader areas of a site (encompassing multiple Operable Units or Areas of Concern). A long-term stewardship CSM, however, may be difficult to develop or impractical at large, complex sites. Functional equivalents could include management plans specific to particular biological resources, or area management plans.

Long-term stewardship CSMs could be used to illustrate the characteristics of a site and its residual hazards, how hazards have been contained, how exposure pathways have been blocked, and the uncertainties that may affect the performance of engineered and institutional controls. Where significant uncertainties exist, the CSM could identify the range of scenarios that are probable or otherwise indicate the importance of the uncertainties. The resulting model could serve as the basis for evaluating the likelihood and consequences of events such as barrier failures, identifying how stewards can plan to mitigate these events, and predicting the ability of future generations to ensure protectiveness based on improved technology and increased understanding of science. The CSM also could serve as a tool for communicating with local governments and stakeholders. An example of a long-term stewardship conceptual site model is presented in Appendix E.

- **Developing Uncertainty Matrices to Communicate Uncertain Conditions**. Uncertainty matrices can be used to describe the expected condition and performance of an engineered or institutional control; potential failures and their likelihood; expected impacts; monitoring strategies to prevent or detect failures; and contingency plans to mitigate failures. Uncertainty matrices also can be used to evaluate the relative need for "layering" of controls. Greater "layering" (e.g., multiple engineered and institutional controls, more frequent monitoring and reporting requirements) will be needed if (1) there are many uncertainties; (2) uncertainty is very large, and/or (3) the consequences of potential failures are very high. Appendix F presents an example of an uncertainty matrix.

Long-term Stewardship at Maralinga, Australia

The British government, with the agreement and support of Australia, carried out nuclear tests between 1952 and 1963 at three sites in Australia. Maralinga in South Australia was the most used site, and hosted two major and several hundred minor trials, as well as various assessment tests and experimental programs. The trial resulted in the dispersal of roughly 24 kilograms of Plutonium-239 in the area of Maralinga. The site was officially closed in 1967 following the cleanup effort termed *Operation Brumby*.

Maralinga was Tjarutga Aboriginal land prior to the testing. The Tjarutga were displaced in 1953, and were allowed to return to their land in 1984. Between 1984 and 1996, the Australian Radiation Protection and Nuclear Safety Agency assessed the extent, quantities, and physical characteristics of plutonium that remains and conducted dose assessment studies. In cooperation with the Tjarutga, the Agency agreed to remove surface soil from the most contaminated areas, and to restrict the use of another 120 square kilometers of land to transitory activities such as hunting and travel. Planned institutional controls include:

- A buffer zone surrounding the contaminated land.
- Removal of regular travel tracks and paths through the contaminated area.
- Construction of alternative tracks and paths outside the contaminated area and buffer zone.
- Installation of boundary markers and signs.
- Construction of a fence around the perimeter of the contaminated area and buffer zone.

Sources: Australian Radiation Protection and Nuclear Safety Agency website (*http://www.arpansa.gov.au/er_mrp.htm*); Australian Department of Primary Industries and Energy internet website (*http://webserver.dpie.gov.au/dpie/pr/issues_papers/96_3.html*)

Chapter 6: Managing Real Property

DOE conducts cleanup of real property (land and facilities) owned by the federal government, states, and private parties. DOE real property – primarily land – is a key focus of long-term stewardship. It will be difficult if not impossible to ensure long-term protection of human health and the environment without the ability to maintain appropriate controls on the use of real property. Real property includes land and structures on the land such as buildings, mission-related infrastructure, waste disposal facilities, and other waste management units. Long-term stewardship must also address issues associated with groundwater, surface water, natural resources, and cultural resources. However, rights to water and mineral resources may be managed differently than surface property rights. At Rocky Flats, for example, DOE owns the land but not the mineral rights beneath the land.

DOE currently has an inventory of about 2.4 million acres of land. Much of this property once supported weapons production activities or was used as buffer zones, and DOE retains ownership or control of nearly 90 percent of the land acquired for that mission since 1942. This chapter describes how DOE currently plans the development and use of the real property it controls; how land and other real property is managed; how property is transferred out of DOE; and how DOE may maintain certain control over property for long-term stewardship purposes after the property has been transferred. This chapter also describes some of the challenges associated with integrating long-term stewardship concerns into current planning practices, and presents alternatives for addressing these challenges. Appendix G provides a more detailed discussion of the technical and legal aspects of real property management and transfer.

APPLICABLE SCOPING COMMENTS
(see Exhibit 2 in Appendix B)

- Long-term stewardship commitments associated with proposed new missions and new facilities should be identified in approval decision documents for the facility (15, STGWG)
- When starting new projects, DOE should be required to provide a technical and financial plan to clean up and maintain any resulting waste (18)
- DOE should retain ownership and control of lands for which institutional controls are necessary unless adequate legal mechanisms and institutions exist to enforce such controls against future landowners (STGWG)
- DOE needs to make distinctions between parts of sites that are very contaminated and parts of sites that are clean (18)
- DOE should explicitly show how liability will be transferred in the event of the failure of a subsequent landholder to perform long-term stewardship adequately (e.g., bankruptcy) (16)
- The study should discuss the approaches to long-term stewardship and land use control used by other federal agencies and other nations (2)
- DOE should ensure effectiveness of mechanisms for restricting future land use (10)
- The study should carefully review, document, and provide recommendations on the transfer of cleanup and long-term stewardship liability for properties that are sold into the private sector or to other governmental agencies (16)

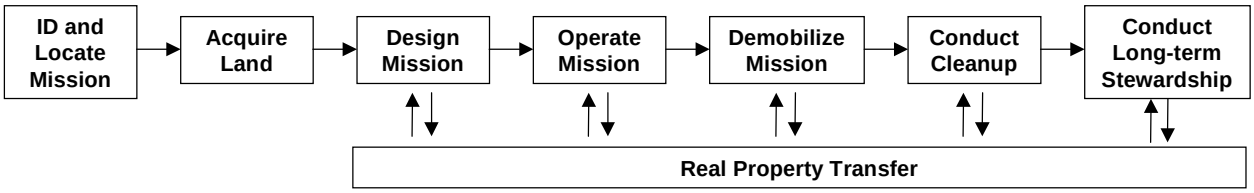
APPLICABLE ISSUES
(see Exhibit 3 in Appendix B)

6. Relationship of Facility Development Planning to Long-term Stewardship Needs
10. Property Transfer Policies and Procedures

6.1 Planning

The life-cycle of DOE mission activities at a site may include up to seven stages (Exhibit 6-1). Each of the initial stages of the mission life-cycle, and several of the later stages, are covered by planning processes that are mandated by a variety of laws, regulations, and DOE internal directives. Different authorities, including statutes and internal DOE directives create land use planning requirements.[60] Statutes establishing the requirements for cleanup, particularly CERCLA and RCRA, also can play a prominent role in planning at different points in the life-cycle of DOE activities at a site.[61] In principle, NEPA and DOE Orders, such as DOE Order 430.1A, Life Cycle Asset Management (LCAM), cover the entire mission life-cycle. In practice, it has been difficult to cover the entire life-cycle within a single planning activity such as preparation of an Environmental Impact Statement (see Exhibit 6-2).

Exhibit 6-1. Life-Cycle of DOE Activities at a Site

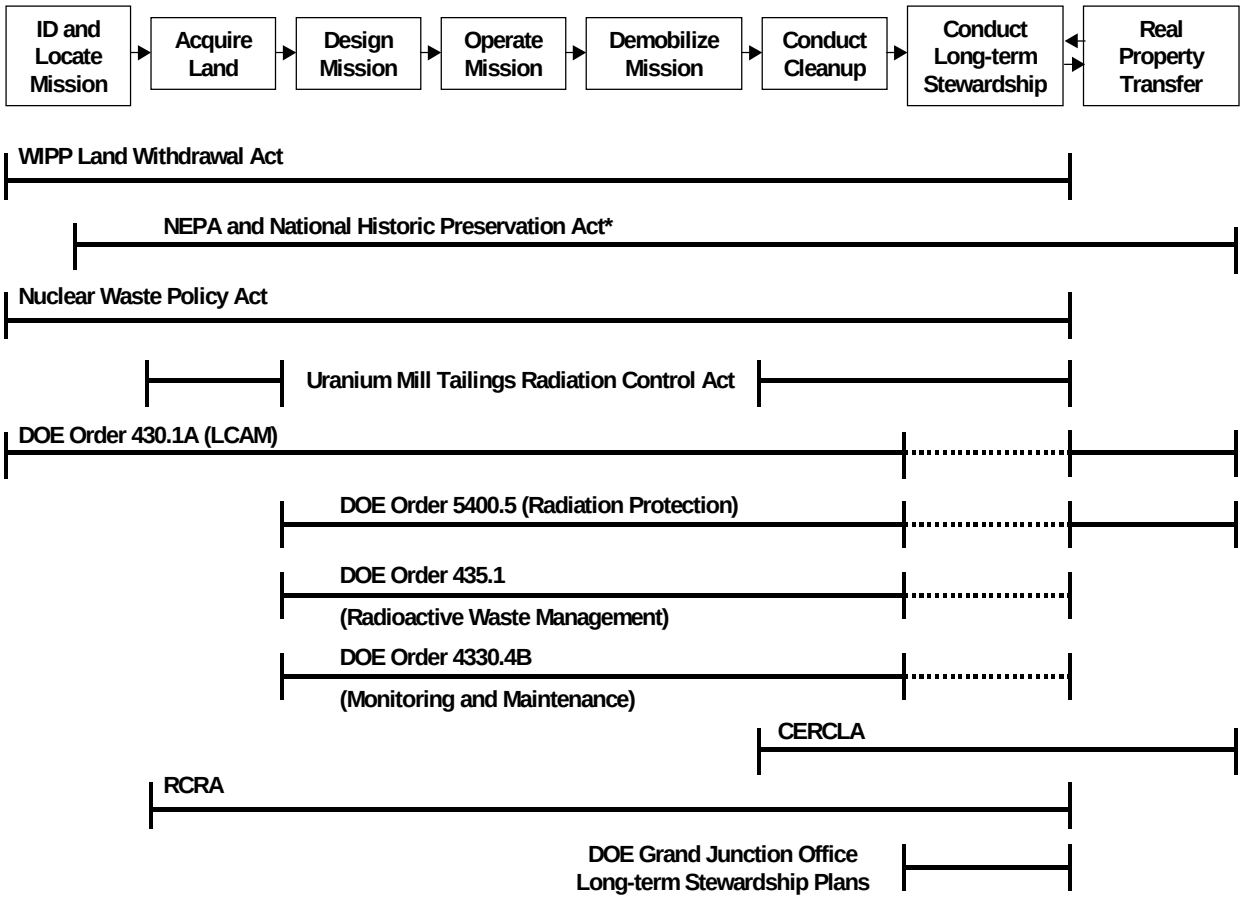


The mission life-cycle begins when DOE identifies and selects a site for the mission. DOE then must acquire the land, with appropriate buffer areas for safety and security, to support the mission. In the mission design stage, DOE must design and build the facilities, infrastructure, and other assets needed to support the mission. During operation, DOE performs the mission in accordance with applicable laws and regulations. After operation, DOE demobilizes the mission. During and after operation, DOE completes needed decontamination and decommissioning, waste management, environmental restoration, and material disposition. In some cases, site missions other than long-term stewardship also continue beyond cleanup. When cleanup is complete, DOE conducts appropriate long-term stewardship. If the property is no longer needed for a DOE mission, DOE may transfer it to other federal or non-federal entities.

[60] For example, the National Defense Authorization Act for Fiscal Year 1997 requires the Secretary of Energy to create future land use plans for the Hanford Site, INEEL, the Rocky Flats Site, and the Savannah River Site.

[61] Four federal statutes enact special planning activities for three particular categories of DOE sites. The Waste Isolation Pilot Plant (WIPP) Land Withdrawal Amendment Act (Public Law 104-201, as amended) places specific planning requirements on DOE for WIPP. UMTRCA addresses uranium milling sites. The Nuclear Waste Policy Act addresses high-level waste disposal facilities. Section 632 of the Departments of Commerce, Justice, and State, the Judiciary, and Related Agencies Appropriations Act for Fiscal Year 1998 required DOE to transfer particular parcels of land at or in the vicinity of Los Alamos National Laboratory to local governments.

Exhibit 6-2. Relationship Between DOE Planning Processes and the Life-Cycle of DOE Mission Activities at a Site



*36 CFR Part 800, Advisory Council on Historic Preservation (May 18, 1999) directs federal agencies to coordinate compliance with NEPA and the requirements of the National Historic Preservation Act (NHPA) and to consider NHPA requirements as early as possible in the NEPA process (36 CFR Part 800.8).

Planning processes under a variety of federal laws and DOE directives collectively cover the full life-cycle of DOE mission activities at a site, but no single law or directive has been used to cover the full life-cycle. The solid lines indicate the stages of DOE mission activities that have been covered by each specific statute or directive. For example, the Uranium Mill Tailings Radiation Control Act requires DOE to take ownership of certain Title II sites after cleanup (solid line on the left) and to conduct cleanup and long-term stewardship at Title I sites (solid line on the right). However, the Act does not address the possibility of property transfer from DOE ownership and control. A dotted line indicates where a specific directive applies to all DOE activities but does not specifically identify long-term stewardship (or its functional equivalent) as an activity. For example, DOE Order 435.1 directs DOE to manage radioactive waste but does not specifically direct DOE to conduct long-term stewardship for residual radioactive contamination..

6.1.1 Planning under NEPA

Although many DOE sites were established before its enactment, NEPA now plays an important role in site planning. NEPA and its implementing regulations require DOE and other federal agencies to evaluate the environmental impacts of proposed actions that may have significant environmental effects (e.g., a major change in the structures or operation of an existing facility; decontamination, decommissioning, and disposition of an existing facility; the siting,

construction, operation, decontamination, decommissioning, and disposition of a new facility). However, documents produced under NEPA at early stages in the planning process are not always able to fully consider the complete life-cycle of a proposed action. For example, potential impacts of decontamination and decommissioning activities on future land use for a proposed action may be considered too speculative for analysis at the beginning of a project (i.e., during the initial planning process), although NEPA requires a reasonable effort to obtain such information.[62]

Because information related to the "back end" of the life-cycle of a proposed action tends to be difficult to quantify during the planning process, initial NEPA analyses are limited in their ability to consider the life-cycle costs and associated longer-term environmental impacts of the various alternatives for the proposed action. This makes it necessary to periodically review more complete information about long-term stewardship as it becomes available to see whether decisions should be revisited or if an earlier NEPA review should be supplemented. For example, it may become apparent upon later review that DOE has selected an alternative that will result in significant long-term stewardship liabilities, when another alternative also capable of meeting the mission objective would have resulted in fewer or less costly long-term stewardship requirements.

6.1.2 Planning under DOE Orders

DOE's internal operating procedures and directives include planning requirements. Land use planning at DOE sites historically has focused on developing facilities and infrastructure to support DOE missions (including cleanup) often assuming that these missions would continue indefinitely.[63] Planning documents developed prior to 1994 generally did not consider land use patterns in surrounding communities, or the potential consequences of completing site missions and transferring site lands to other owners. In fact, many plans were classified or otherwise controlled because they contained sensitive information.

In 1994, DOE land use planning was re-organized under DOE Order 430.1A, Life Cycle Asset Management (LCAM). LCAM is focused on performance-based management of real property over its entire life-cycle: from planning to acquisition, through operation, decommissioning, and disposition or transfer out of DOE control. LCAM, which is still in effect, provides overall performance requirements, but otherwise allows sites the flexibility to specify their planning process. Although LCAM requires a comprehensive land use planning process with stakeholder involvement, the quality and content of land use plans are left to the discretion of DOE program

[62]For example, in the Final EIS for the Advanced Mixed Waste Treatment Project facility at the Idaho National Engineering and Environmental Laboratory, DOE stated that: "The nature, extent and timing of future D&D activities are not known at this time. No meaningful alternatives or analysis of impacts can be formulated at this time since D&D is so remote in time that neither the means to conduct D&D, nor the impacts of the actions, are foreseeable in the sense of being susceptible to meaningful analysis now. Accordingly, D&D activities are not analyzed in detail." *Advanced Mixed Waste Treatment Project. DOE/EIS-0290, January 1999, Section 3.1.*

[63]Until 1994, planning was governed by DOE Order 4320.1b, supplemented by additional planning directed at radiation protection (DOE Order 5400.5), and radioactive waste management (DOE Order 431.5).

directors.[64] In 1996, the Department issued DOE Policy 430.1, Land and Facility Use Policy (July 9, 1996), which further addresses life-cycle planning activities for DOE land and facilities. The policy promotes the involvement of the surrounding communities and the integration of missions, ecology, cultural, and social factors in a regional context.[65]

Although LCAM is intended to apply over the entire life-cycle of DOE's management of real property, it has been difficult to develop operational requirements specific to long-term stewardship. For example, the Order does not explicitly identify long-term stewardship as a requirement, or explicitly require development of long-term stewardship plans prior to project design or execution. As a consequence, a recent analysis of land use plans developed by sites pursuant to LCAM suggests that land use planning for long-term stewardship is not always addressed in a comprehensive and coordinated manner by the sites and their surrounding communities.[66]

Bureau of Land Management (BLM) Land Use Planning

BLM's planning processes are established primarily by the Federal Land Policy and Management Act (FLPMA). The FLPMA requires BLM to prepare land use plans to provide management direction for the public lands. Since 1984, BLM has completed 108 Resource Management Plans; 56 earlier and smaller Management Framework Plans (MFP) are still in place. These plans are periodically evaluated, amended or revised to respond to new circumstances or proposals. Some of the MFPs are replaced by new Resource Management Plans when the decisions in the MFPs are no longer valid and it is not feasible to update the decisions through the MFP amendment process. Planning Regulations at 43 CFR Part 1610.2(b) require BLM to annually publish a planning schedule identifying plan amendments and new Resource Management Plans in progress or planned over the next three years. Six Resource Management Plans were scheduled to be completed in FY 1999 and one is scheduled to be completed in FY 2000.

Source: U.S. Department of Interior, Bureau of Land Management
http://www.blm.gov/nhp/what/PAC_support/planschedule0.htm

[64]LCAM-based plans have won awards from the American Planning Association and have peer respect. For example, the INEEL Comprehensive Facility and Land Use Plan was recognized as the Outstanding Federal Planning Project for 1997 by the Federal Planning Division of the American Planning Association for its original and comprehensive analysis of the environmental, historical, cultural, and economic assets of the region and their relationships to the future growth of the site. The INEEL plan is available at *http://titanic.inel.gov:1025/index.html*

[65]In some cases, state planning requirements also may be pertinent, and county and city government-derived authority for land use planning (e.g., local governments adjacent to the Hanford Site pursuant to Washington State's Growth Management Act).

[66]Lowrie, K. *Land Use Planning On and Around U.S. DOE Sites: Communication, Coordination, and Commitment*. CRESP-EOHSI, Draft, September 1999. This study, based on a survey of 21 off-site municipal or county planners from counties that have land area occupied by part of a DOE site and major host or adjacent towns, as well as on-site planners at 13 major sites, concluded that "although sites are required to do land use planning, there have been so many different initiatives in this direction that sites have been, at best, free to adopt or pursue what type of land use planning suits their needs, and, at worst, confused as to how to meet requirements and have therefore done nothing." The study identified a need for substantially more direct communication between the sites and local planners: more mutual review and comment on land use plans between the sites and neighboring jurisdictions; early involvement of local officials in developing and defining roles and responsibilities for stewardship; and coordination and linkage of on-site and off-site databases of land use information with local land use agencies.

To improve future project planning documentation and life-cycle cost analyses, DOE may need to place greater emphasis on identifying and addressing any long-term stewardship activities that are required for the asset. In addition, planning under LCAM may need to identify long-term stewardship as a performance measure in the facility disposition process.

6.1.3 Integrating Long-term Stewardship More Effectively Into Planning

Comments and suggestions forwarded to DOE have noted three general options for improving planning requirements to more effectively integrate consideration of long-term stewardship in land use plans. The three suggested approaches summarized below are not mutually exclusive.

- **DOE could develop site-specific long-term stewardship plans at all DOE sites**. Congress has directed that the Waste Isolation Pilot Plant and uranium mill tailings sites have site-wide long-term stewardship plans. As a management tool, the DOE Grand Junction Office requires a site-wide plan prior to accepting a new site into the long-term surveillance and monitoring program. Other DOE sites are not required to have site-wide long-term stewardship plans, although CERCLA Operation and Maintenance Plans and RCRA post-closure permits may cover some long-term stewardship requirements for specific areas. Sites will continue to conduct the planning activities that are directly required by other applicable requirements, including DOE directives, external regulations, and site-specific compliance agreements. Many sites may develop site-specific long-term stewardship plans that incorporate the planning activities conducted pursuant to those directives. Other sites may address long-term stewardship planning in a different manner that is consistent with the needs of stakeholders, regulatory agencies, and Tribal nations. DOE could improve the consistency of site-specific long-term stewardship plans in terms of scope, level of detail, and organization by: (1) requiring all sites to develop long-term stewardship plans; (2) developing comprehensive guidance for these plans; and/or (3) conducting pilot projects to develop a model plan at one or more sites.

- **DOE could adopt "pollution prevention" concepts into mission planning and operation to increase the reliability of and reduce the need for long-term stewardship**. The use of pollution prevention principles in long-term stewardship planning can address, in the initial planning stages, the potential impacts after mission completion. At DOE sites with ongoing missions, DOE could incorporate long-term stewardship considerations in all planning efforts. Because the effectiveness of long-term stewardship is uncertain, the best way to ensure against ineffectiveness is to minimize the need for long-term stewardship through careful consideration of the long-term stewardship implications of DOE decisions. Decisions concerning the continued generation of an existing waste stream at a site could consider the extent to which that generation is creating or contributing to residual hazards that will require long-term stewardship. Decisions concerning constructing and operating a new facility could consider the ability to decontaminate and decommission the facility after the mission is completed. DOE could draw upon the experience other federal agencies have with life-cycle mission planning that includes long-term stewardship. DoD regulations require life-cycle planning for new missions and programs, including the following life-cycle phases:

manufacture, test and evaluation, deployment, maintenance, demilitarization, and disposal.[67] Life-cycle planning and analysis for new DoD missions and programs includes NEPA analysis. The National Park Service also conducts planning for long-term stewardship, including NEPA analysis, under its Disturbed Lands Restoration Program and Abandoned Mineral Lands Program.[68] The concepts of pollution prevention, waste minimization, and stewardship minimization can be incorporated into the NEPA process for the evaluation of proposed actions and alternatives.

- **DOE could coordinate land use planning processes more thoroughly with planning processes conducted by affected parties**. Such coordinated planning would be beneficial in two situations. First, where uncertainty exists with respect to the potential migration of contamination off-site (e.g., groundwater plumes), coordinated planning could enhance the protectiveness of long-term stewardship. For example, DOE could assist local communities or Tribes in determining where use or zoning restrictions would prevent exposures in the event that a groundwater plume were to migrate off-site. Second, decisions about transfers of property to non-federal owners depend upon whether the federal government, local governments, or the new owners can and will enforce long-term restrictions on use of the property and supply periodic maintenance where required. Coordinated planning could help define the roles and responsibilities of federal, state, local, and Tribal governments with respect to the creation and maintenance of land use controls. It also could be a means through which local governments take an active role in monitoring properties or maintaining and enforcing land use controls.

6.2 Property Transfer

At the conclusion of current cleanup activities, lands and other real property owned or controlled by DOE may be retained indefinitely in federal control or transferred to non-federal ownership. A variety of options are available for the transfer of DOE property to other federal agencies and non-federal owners.

The Department may transfer the property under a variety of authorities, including the AEA, General Services Administration (GSA) regulations, and specific Congressional legislation such as the Federal Property and Administrative Services Act, the Hall Amendment to the DOE Organization Act, and Public Law 105-119. Real property may be transferred to the Secretary of the Interior, under direct management of the Bureau of Indian Affairs, to be held in federal trust for Tribal nations.[69] In many cases, other federal agencies have the right of first refusal for excess real property owned or controlled by DOE (e.g., land withdrawn from the Department of

[67]Department of Defense Regulation 5000-2-R - Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information System Acquisition Programs.

[68]13 Steps to a Restoration Project, U.S. Department of Interior, National Park Service, *www.aqd.nps.gov/grd/distland/toolbox/15steps.htm*; Abandoned Mine Lands Program, U.S. Department of Interior, National Park Service, *www.aqd.nps.gov/grd/distland/amlreports/puf.pdf*

[69]As part of the Federal Indian Trust Responsibility, the federal government must hold and appropriately manage land for federally-recognized tribes. However, the Department of the Interior is committed to promoting tribal control and self-determination over tribal trust lands and resources (*Principles for the Discharge of the Secretary's Trust Responsibility*, Department of Interior Order 3215, April 28, 2000).

the Interior, acquired land transferred via GSA). These disposition paths will affect long-term stewardship in different ways. DOE requirements for real property transfers are discussed in more detail in Appendix G.

The least complicated transfer will occur if the property is not needed for any continuing DOE mission and if the property has been cleaned up to levels that support unrestricted use. In that case, the only long-term stewardship obligations that will accompany the property or remain with DOE is routine record-keeping. The transfer of property that requires long-term stewardship to another federal, state, Tribal, local, or private entity presents challenges to long-term stewardship implementation. In this case, as part of the transfer process, DOE and affected parties will need to determine:

- The parcels for which long-term stewardship is needed.
- What types of management or use restrictions are necessary for the parcel.
- Whether use restrictions should affect only the entity to whom the property is transferred or apply more broadly to all subsequent owners.
- Procedures for overseeing all restrictions or limits that are imposed. Note that providing oversight may be difficult (see Exhibit 5-4).
- Funding and responsibility for long-term stewardship activities.

Leasing Property at DOE Sites

Several mechanisms are available to implement leases of DOE property. DOE has implemented guidance on the protection of workers using DOE leased facilities.

- DOE can lease property under section 161(g) of the Atomic Energy Act, provided that the property was acquired by DOE in connection with functions pursuant to the Act or the property will be used to carry out objectives of the Act.
- Section 649 of the DOE Organization Act authorizes DOE to lease facilities that are temporarily not needed for up to five years if leasing is in the public interest. Unused facilities at the Hanford Site have been leased under this authority.
- The Hall Amendment to the DOE Organization Act allows DOE to lease excess property for up to 10 years at DOE facilities to be closed or reconfigured. The Hall Amendment provides EPA with the authority to concur in the DOE determination that lease conditions are "consistent with safety and protection of public health and the environment." Surplus facilities at the Oak Ridge East Tennessee Technology Park have been leased under this authority.

Sources: (1) *Selecting a Suitable Transfer Mechanism: Benefits and Limitations,* U.S. Department of Energy, Office of Environmental Management, May 13, 1997 (*http://www.em.doe.gov:80/future/sec6.html*). (2) *Joint DOE/EPA Policy Statement on Leasing under the "Hall Amendment,"* Memorandum from Timothy Fields, Assistant Administrator, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency; James M. Owendoff, Acting Assistant Secretary for Environmental Management, U.S. Department of Energy; Robert W. DeGrasse, Jr., Director, Office of Worker and Community Transition, U.S. Department of Energy; and G. Thomas Judd, Director, Office of Field Management, U.S. Department of Energy, June 30, 1998 (*www.epa.gov/swerffrr/doc/halltran.htm*). (3) *Guidance on the Protection of Workers using DOE Leased Facilities,* U.S. Department of Energy, Office of Worker and Community Transition, August 6, 1999 (*http://www.wct.doe.gov/owct/Documentation/Authorities%20and%20Guidance.htm*).

A variety of factors will affect the choice of a disposition path. DOE will need, as a first step, to determine the suitability of the property for disposition. This means systematically assessing sites and portions of sites to determine if they are needed for a continuing DOE mission other than long-term stewardship. Unused property must then be given a second screening to determine whether it should remain in DOE possession for long-term stewardship or can be released with or without restrictions. To date, these decisions have been made under a variety of statutory and regulatory authorities and via different processes (see Exhibit 6-3). The following factors will be particularly important for evaluating the potential for transferring real property from DOE control to another federal or non-federal entity:

- **Potential legal restrictions**. Under current law, parcels of land which are part of a larger site that is listed in its entirety as a single site on the CERCLA National Priorities List (NPL) cannot be transferred unless (a) EPA concurs with the transfer or (b) the larger site is deleted from the NPL. If the site is not on the NPL, then DOE must obtain concurrence from the appropriate state agency. If a parcel contains residual radioactive contamination or materials at levels subject to regulation under the AEA, it may not be possible for DOE to transfer responsibility for long-term stewardship over those materials to another federal or non-federal entity without the NRC or an agreement state licensing the entity for their possession.

- **Tribal Treaty Rights and Federal Indian Trust Responsibility**. Tribal nations have legal rights to pursue certain activities (e.g., hunting, gathering plants, pasturing livestock) on certain lands identified in treaties (e.g., "open and unclaimed lands"). There is disagreement as to whether these treaty rights apply to certain withdrawn lands (e.g., at Hanford).[70] In addition to specific treaty rights, the Federal Indian Trust Responsibility is a legally enforceable fiduciary obligation, on the part of the United States, to protect tribal lands, assets, resources, and treaty rights, as well as duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. DOE's implementation of this responsibility is directed by Executive Memorandum and DOE Order.[71] In several cases discussing the Trust Responsibility, the Supreme Court has used language suggesting that it entails legal duties, moral obligations, and the fulfillment of understandings and expectations that have arisen over the entire course of dealings between the United States and the Tribes.[72]

- **The nature and extent of residual contamination and other site hazards**. These must be considered in determining both whether to transfer property and what restrictions should be placed on that property if transferred. Documents that assess the environmental baseline, such as discharge permits, release sites, sampling plans and results, and descriptions of all waste management units will be needed. Federal and state regulators involved in the decision process will need to be notified at the start. In most cases, their concurrence with DOE's decision to transfer the property will be needed.

- **Property rights that do not convey with surface rights**. Minerals in place (in many states) may be conveyed by deed separately from the overlying property. Generally, the ownership of land overlying a groundwater resource determines access to the resource. However, in some states a permit to withdraw groundwater may be required. Also, in some states, groundwater may be withdrawn for use either on or off the overlying land even if this interferes with use by another landowner.

- **Needs for buffer zones and other "set-asides."** Uncontaminated property may be needed as a safety buffer zone around continuing or future mission needs other than long-term stewardship. Other areas may be set aside to protect valued natural resources or cultural resources.

- **Local interest in site re-use for economic development and other socio-economic or environmental justice considerations**. Public and Tribal government involvement will be necessary throughout the process to determine suitability for transfer. DOE may need to continue to build upon existing public involvement processes (e.g., Federal Advisory Committees such as Site-Specific Advisory Boards, site planning boards) to more effectively involve affected parties in property management issues (see also Chapter 9).

---

[70] *Hanford Comprehensive Land-Use Plan Environmental Impact Statement*, DOE/EIS-02222-F, September 1999.

[71] *Memorandum for the Heads of Executive Departments and Agencies – Subject Government to Government Relationship with Native American Tribal Governments*, Executive Memorandum, April 29, 1994; DOE Order 1230.2, American Indian Tribal Government Policy.

[72] Seminole Nation v. United States, 1942, 316 U.S. 286 (1943); see also *http://www.doi.gov/oait/q&a.htm.*

DOE has developed guidance outlining the information relating to the past as well as the current history and condition of the parcel that is required before property can be transferred.[73] The necessary information includes CERCLA Records of Decision or other decision documents that identify cleanup end states and long-term stewardship strategies, NEPA review, safety/hazard analyses, and detailed real property records. In most cases, new property surveys and deed registrations will be needed to prepare for long-term stewardship activities or reduce acreage required to support ongoing site missions. Real property records, to be complete, also should identify all infrastructure on the parcel, current and past facilities, boundaries, and all easements or covenants. For buildings, information about zoning and code compliance, structural integrity, and electrical and mechanical systems should be included, although as-built drawings and other records for older facilities may not be available (see Chapter 7).

Indemnification Following Property Transfer

Section 3158 of the National Defense Authorization Act of 1998 authorizes the Secretary of Energy to hold harmless and indemnify a person or entity to whom property is transferred against any claim for injury to person or property that results from the release or threatened release of a hazardous substance or pollutant or contaminant as a result of DOE activities at the defense nuclear facility on which the real property is located. This indemnification does not apply to the extent that the persons and entities contributed to any such release or threatened release. (42 USC 7274(q)(b))

DoD has extensive experience in property transfer through implementing the Base Realignment and Closure (BRAC) Program. DoD has received explicit statutory authority to conduct transfers of DoD property at closing and realigning military bases, and is implementing the program under an extensive series of regulations and guidance documents.[74] DoD has developed a classification system for properties intended for disposal, and property must be qualified for disposal through an Environmental Baseline Survey and either a Finding of Suitability for Transfer (FOST) or Finding of Suitability for Lease (FOSL). Typically, DoD property transfer is accomplished through an Economic Development Conveyance to an approved Local Redevelopment Authority.

[73] *Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfers*. U.S. Department of Energy, Office of Environmental Policy and Assistance. DOE/EH-413/97/2, October 1997.

[74] *The Environmental Site Closeout Process Guide*, U.S. Department of Defense, Air Force Base Conversion Agency, September 1999; A Guide to Establishing Institutional Controls at Closing Military Installations. U.S. Department of Defense, February 1998; *Guidance on the Environmental Review Process to Reach a Finding of Suitability to Transfer for Property where Release or Disposal has Occurred*, U.S. Department of Defense, June 1994 (available at *http://emmisary.acq.osd.mil/bccr/brim*).

Recent DOE Land Transfer Experiences

Hanford Site. The State of Washington and EPA determined that the 1100 Area at Hanford poses no significant threat to public health and the environment and deleted the Area from the CERCLA National Priorities List in 1996. The 870 acre property was transferred to private ownership pursuant to section 161(g) of AEA. GSA was not involved in the transaction, although the general structure of GSA's land transfer process was used. An Environmental Assessment under NEPA was prepared that concluded that all hazardous materials would be removed prior to transfer of ownership, and a Finding of No Significant Impact was made. Prior to the transfer, historical records were reviewed, and potentially problematic areas were surveyed for radiation using DOE Order 5400.5 radioactive release criteria. After the transfer, DOE Richland radiology staff requested additional surveys, which will be accomplished in the near future. DOE does not have an easement to conduct a survey, just a good faith agreement. Contingency provisions within the land transfer agreement allow for future DOE remediation on the property if post-transfer surveys or sampling identify any contamination.

Sources: *Environmental Assessment for the Transfer of 1100 Area, Southern Rail Connection and Rolling Stock*. Hanford Site, Richland, Washington, U.S. Department of Energy, August 1998, DOE/EA-1260; 61 FR 51019, September 30, 1996.

Mound Site. In 1998, DOE agreed to sell the Mound Environmental Management Project Site (formerly the Mound Plant) to the Mound Miamisburg Community Improvement Corporation (MMCIC). DOE will convey the entire site to MMCIC in discrete parcels, or "release blocks." The sales contract specifies that a release block must be remediated pursuant to CERCLA, and each conveyance must be formally approved by EPA. Such transfers are authorized by section 3154 of the National Defense Authorization Act of 1994 (the Hall Amendment to the DOE Organization Act), which allows for below market rate transactions for economic development. MMCIC in turn subleases parcels to private entities. DOE operations and decontamination and decommissioning activities are continuing at the Project Site. Some parcels have been occupied by private sector tenants prior to the remediation of the entire release block. The tenants are generally not familiar with DOE operating procedures. A recent study by the Environmental Law Institute reviewed the master lease between DOE and MMCIC and the subleases between MMCIC and its subtenants. The study identified several provisions that serve as controls to ensure compliance with regulatory requirements and to ensure that exposures during reuse of the site are consistent with cleanup to industrial reuse standards. However, the study questioned whether lease restrictions or deed restrictions alone would be effective in managing residual hazards.

Sources: *Miamisburg Environmental Site Management Project Site Profile*, DOE Office of Oversight, Environmental, Safety, and Health, June 1999; *Institutional Controls Case Study: Mound Plant*. Environmental Law Institute, 1998; *Integrated Safety Management Evaluation of the Miamisburg Environmental Management Project*. U.S. Department of Energy, Office of Environment, Safety, and Health, July 1998. EM2MGT/07-98/01SH; *Mound's Land Transfer Process*. U.S. Department of Energy, Miamisburg Environmental Management Project, Miamisburg, Ohio, 1999; *Commercialization of the Mound Plant, Miamisburg, OH*, DOE/EA-1001; *Disposition of Mound Plant's South Property, Ohio*, DOE-EA-1239.

Los Alamos National Laboratory (LANL). In 1997, Congress passed Public Law 105-119, the *Departments of Commerce, Justice, and State, the Judiciary, and Related Agencies Appropriations Act, 1998*, which directs DOE to convey or transfer certain parcels of DOE land in the vicinity of LANL to the Incorporated County of Los Alamos, New Mexico, and to the Secretary of the Interior, in trust for the Pueblo of San Ildefonso. DOE's responsibilities under the Act include identifying potentially suitable tracts of land; conducting a title search on each tract; identifying and conducting any environmental restoration and remediation needed for each tract; and conducting a NEPA review of the proposed conveyance. DOE has no role in the designation of recipients nor how the parcels of land will be allocated between the recipients.

Source: *Final Environmental Impact Statement for the Conveyance and Transfer of Certain Land Tracts Administered by the U.S. Department of Energy and Located at Los Alamos National Laboratory, Los Alamos and Santa Fe Counties, New Mexico*. U.S. Department of Energy, Los Alamos Area Office, Los Alamos, NM, DOE/EIS-0293, October 1999.

6.3 Post-Transfer Property Management

DOE's role in long-term stewardship may not end after property is transferred, particularly if that property requires the maintenance of access or use restrictions.[75] As Chapter 5 described, such restrictions could take several forms:

- **Planning restrictions**, in which the transferee is required under enforceable provisions of the transfer document (e.g., an enforceable deed restriction incorporated into a sale agreement or condition of a lease agreement) to adopt and enforce the existing land use plan. Planning restrictions may be difficult to enforce. For example, even if a site-specific land use plan has been developed under NEPA (as at Hanford, for example),[76] the Record of Decision can be changed. Even if the property or portion of the property is transferred to another federal agency or consulting Tribal government included in the NEPA process, the Record of Decision is not binding on the cooperating agency or consulting Tribal government and does not create an obligation for a cooperating agency or consulting Tribal government to implement the plan. Once the property leaves DOE control, DOE would not have control over the use of the land unless the property is conveyed with deed or other legal restrictions.

- **Traditional land use restrictions**, which are created by covenants, deed restrictions, reversionary clauses, or similar provisions. The availability of such restrictions and special circumstances governing their enforcement and persistence generally would be established by state law and therefore would be likely to differ from state to state. DOE might also create and enforce easements to ensure continued access to sites for monitoring and maintenance of waste disposal facilities. The availability and limitations of land use restrictions that can be implemented by DOE would also vary according to state law.

- **Zoning restrictions**, which would require the cooperation and continuing involvement of Tribal and local governments because they could probably not be enforced directly by DOE. The roles and responsibilities of the federal, local, and Tribal governments would need to be defined and agreed upon, and DOE might need to supply necessary technical expertise.

DOE has used deed restrictions (e.g., reversion clauses) to retain the authority to ensure the continued maintenance of institutional controls after property has been released. Examples include:

- Disposal of property on the Monticello, Utah, site involves deed restrictions establishing prohibition of residential development without prior DOE approval and prohibition of groundwater use.

- In 1973, 2,200 acres surrounding the Argonne National Laboratory East facility were transferred to a local forest preserve district. The deed included future use limitations

[75] *CERCLA Requirements Associated with Real Property Transfers*, U.S. Department of Energy, Office of Environmental Policy and Assistance, CERCLA Information Brief. EH-413-9808, April 1998.

[76] *Hanford Comprehensive Land-Use Plan Environmental Impact Statement*, Section 1.4.3. DOE/EIS-02222-F, September 1999.

because shallow groundwater and surface water contaminated with volatile organic compounds had migrated into the preserve.

- At the Oak Ridge Reservation, disposals of land to private parties by means of quit-claim deeds included deed provisions in which DOE reserved rights of continuing access and specified that the property could only be used for certain purposes or it would revert to DOE.

Three issues for long-term stewardship are raised by these experiences with post-transfer controls:

- Additional staff and resources, focused on monitoring institutional controls and enforcing land use restrictions, may be needed as more properties, with more complicated and numerous restrictions, are transferred by DOE.

- DOE may need to be prepared to enforce institutional controls through judicial or administrative means if local governments or private individuals to whom property has been transferred do not adhere fully to the restrictions.

- For transfers within the federal government, DOE and/or Congress will need to decide whether the funding/budget authority required to conduct long-term stewardship activities transfers with the parcel or remains with the program that transferred the parcel.

Other federal agencies have experience enforcing institutional controls after real property transfer. Findings of Suitability for Transfer and land transfer agreements for DoD property that requires long-term stewardship are required to include provisions allowing for continued access by DoD to conduct CERCLA five year reviews and monitor the effectiveness of engineered and institutional controls.[77] NRC has also addressed decommissioning of NRC-licensed sites and transfer of sites for restricted use, requiring institutional controls to maintain future land use restrictions.[78] The licensee (ordinarily the property owner) is required to demonstrate that required institutional controls are effective, enforceable, and funded prior to property transfer. The licensee also must demonstrate how the responsibility for such controls will be passed on to future responsible parties.

[77]DoD Guidance on the Environmental Review Process to Reach a Finding of Suitability to Transfer for Property where Release or Disposal has Occurred. U.S. Department of Defense, June 1, 1994, *http://emmisary.acq.osd.mil/bccr/brim.*

[78]Draft Standard Review Plan 16.0. Nuclear Regulatory Commission, Nuclear Material Safety and Safeguards, Decommissioning Program; 10 CFR Part 61.

Chapter 7: Information Management

As DOE sites make the transition from cleanup to long-term stewardship, site stewards will need detailed, accurate information about the location and nature of residual hazards and the processes and cleanup strategies that generated these hazards. Other people will need to have access to this information, including health professionals, neighbors who live and work in the surrounding communities, and off-site entities who are responsible for some institutional controls, emergency response, and community planning and development. Even where sites have been cleaned up to levels that support unrestricted use, information that documents the levels of cleanup that were achieved will be needed.[79] The information needs to be available in a useful and readily accessible form. In order for long-term stewardship to be effective, appropriate information should be readily available to the public and all entities conducting long-term stewardship activities.

APPLICABLE SCOPING COMMENTS
(see Exhibit 2 of Appendix B)

- DOE needs to provide adequate information to the public (4, 18)
- DOE should discuss approaches for preserving information about a site and its past activities and contamination history (2)
- DOE needs to institute a reliable documentation update/revision system to ensure that crucial data on each site are preserved (4)
- DOE should identify processes whereby owners and neighbors are made aware of, in perpetuity, the nature and extent of contamination and use restrictions so that any attrition of personnel and changes in filing and computer systems do not result in a loss of corporate memory (16)
- DOE should establish mechanisms for the collection, retrieval, and storage of information needed for long-term stewardship and site historic preservation programs (1, STGWG)

APPLICABLE ISSUE
(see Exhibit 3 of Appendix B)

5. Information Management

This chapter summarizes recent recommendations for improving DOE's information management requirements and practices to better serve long-term stewardship needs. The chapter also describes DOE's efforts to improve the identification, preservation, and future accessibility of this information.

7.1 Current Responsibilities and Practices

Recent studies have described DOE's information management responsibilities and practices as they pertain to long-term stewardship.[80] Many DOE information management requirements were developed to support nuclear weapons production. The basis for these requirements (e.g., a need for secrecy to protect national security, the assumption that site access will be restricted) was and continues to be critical to the success of national security missions. Conversely, long-term

[79] Even at sites where cleanup achieves unrestricted use, it may be necessary to demonstrate that cleanup to a specified level actually was achieved and/or waste actually was removed to another location (e.g., for litigation or property transfer). It also may be necessary to re-evaluate these sites in response to changes in scientific information or health standards.

[80] *Roadmap to the Year 2000*, U.S. Department of Energy, Records Management Quality Improvement Team, Revision 1, August 1995; *Responsible Openness: An Imperative for the Department of Energy*. U.S. Department of Energy, Openness Advisory Panel, Secretary of Energy Advisory Board, August 25, 1997; *Managing Data for Long-term Stewardship*, Working Draft Report Prepared by ICF Kaiser Consulting Group, March 1998.

stewardship requires public awareness and institutional openness to ensure continued protection of human health and the environment.

Many information management practices that were appropriate during weapons production are counterproductive to long-term stewardship goals, particularly where property, facilities, and other site assets may be leased or transferred to non-DOE entities.

Openness vs. Protection

Although long-term stewardship generally will require open public access to information, some exceptions are necessary to protect national security (e.g., classified material), privacy (e.g., personnel records), and sensitive natural resources and cultural resources. While the need to maintain these protections presents some challenges for long-term stewardship, it should be possible to preserve the mechanisms currently in place to achieve protection during long-term stewardship. For example, DOE currently provides public access to unclassified information at a site (e.g., information related to cleanup) while at the same time maintaining classified information in a variety of secure databases. In addition, some information about cultural resources (e.g., location of archeological sites) is currently exempt from the Freedom of Information Act, and there is no reason to remove such an exemption for long-term stewardship. Tribes and resource management agencies currently use a variety of techniques to inform the public about the existence of sensitive resources without disclosing their exact locations. There is no reason to anticipate that these techniques are incompatible with long-term stewardship.

Exhibit 7-1 provides an overview of current DOE records management practices.[81] Four major aspects of current information management practices are likely to affect DOE's ability to implement long-term stewardship:

1. **Uniform criteria are needed for identifying information critical for long-term stewardship**. A large amount of information is generated every day at DOE sites in support of regulatory and mission requirements. The Department needs to develop a standard methodology for identifying the portion of this information that will be critical to support long-term stewardship.

2. **Data quality must meet current and future needs**. Current uses of data involve evaluations such as whether an engineered control is functioning properly. Future uses of data may involve evaluations such as temporal trends in contaminant concentration or migration.

3. **Information that may be critical for long-term stewardship needs to be preserved**. As site missions, contractors, personnel, and information management technologies change, information is often destroyed or lost. Information also is rendered useless when it is maintained in an obsolete format, or stored in disarray among other records without being

[81] Although the focus of this chapter is on DOE information management practices, management of some long-term stewardship information is governed by external regulation. For example, section 113(k) of CERCLA requires the establishment of an administrative record file containing all information and documentation used in the selection of a response action. This file must contain documents relevant to the selected remedy as well as relevant comments and information, site-specific data, guidance documents, and technical references that the lead agency considered in the ultimate response selection decision. The administrative record file must be made available for public inspection. Regulations in 40 CFR Part 300.800 pertaining to the administrative record establish procedures for public involvement in the development of the administrative record file. *Source: RCRA, Superfund & EPCRA Hotline Training Module, Introduction to Superfund Community Involvement.* U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. EPA540-R-98-027, June 1998.

catalogued or formally archived.[82] Even when information is sent to a storage repository and adequately documented, in some cases the storage repository is mandated to destroy this information after several years.[83]

Exhibit 7-1: Current Records Management Practices

Information is generated at DOE sites to support a variety of regulatory and mission requirements, including cleanup. Once a given piece of information is generated, it may become a "record" as defined by the National Archives and Records Administration (NARA). Records are used for a period of time and, when no longer in active use, are either preserved permanently or saved for a specified period of time and then destroyed.

Books, reports, maps, and other "hard copy" records typically are preserved by placing them in boxes, indexing the boxes, and shipping the boxes to an interim repository at the site. Records are stored in the interim repository for varying periods of time (e.g., 1 year, 25 years, or longer) until they are either destroyed or shipped to an archival repository managed by NARA.

What is a Record?

The National Archives and Records Administration (NARA) defines records to include all books, papers, maps, photographs, machine readable materials, or other documentary materials, regardless of physical form or characteristics. To be managed by NARA, records must be made or received by an agency of the United States Government under Federal law or in connection with the transaction of public business and must be preserved by that agency or its legitimate successor as evidence of the organization, functions, policies, decisions, procedures, operations, or other activities of the government or because the records contain information of value.

NARA retains the records either permanently or for varying periods of time (e.g., 75 or 80 years). *Records retention schedules* approved by NARA establish specific requirements for preserving and destroying records. Information management practices for electronic materials are evolving. Some electronic materials (e.g., electronic copies of reports) are considered identical to their "hard-copy" counterparts and are preserved in a similar manner. The status of other electronic materials (e.g., databases) is unclear at present. Access to preserved records is achieved by request. The person requesting a record submits a request to NARA (or the organization that manages the onsite repository). Requests for specific records (e.g., an annual report) are filled by locating the box containing the record, retrieving it from storage, extracting the record, and sending a copy to the requestor. Requests for more general information (e.g., all reports that cover groundwater monitoring) are filled by first searching indexing systems to locate potentially relevant records and then following the above retrieval and shipping process. DOE also has developed searchable electronic indexes to certain types of electronic records and has made copies of these records available via the Internet and has developed electronic indexing systems for a variety of hard copy records.

4. **Future generations must be able to locate and readily access the information**. At present, it is difficult to locate and retrieve information from storage repositories without specific knowledge about the existence and archiving of the specific records containing the needed information. For this reason, many of DOE's unclassified documents are effectively

[82]Hedstrom, M. *Playing for Keeps*. Electronic Records Management Conference Proceedings, Canberra, Australia, November 1994.

[83]*DOE Records Retention Schedules*. Available at *http://www-it.doe.gov/records/doers/doers.html*, identify the length of time records are required to be kept. While many critical records are required to be preserved permanently, some records useful for long-term stewardship are required to be retained for less than 100 years. For example, DOE Records Retention Schedule 14: Design and Construction Drawings and Related Records, requires project construction files (including "as built" drawings) for completed projects to be preserved "until dismantlement or disposal of the facility, equipment, system, or process; or when superseded or obsolete; whichever is earlier."

unavailable to the general public.[84] Locating information using general search criteria (e.g., "all soil contamination records from 1995 to 1998") seldom works. When information can be located, it often takes weeks or months to retrieve a record from an archival repository. The search for information is also complicated by the lack of standard methods (e.g., indexing, keywords, geospatial coordinates) for describing and referencing critical information.

In spite of all the cleanup accomplishments to date, if current requirements and practices continue unchanged, future generations may not have access to adequate information to conduct long-term stewardship, and critical information on where and why residual hazards exist may be lost as a result. Failure to generate, identify, and preserve critical information may result in unnecessary exposure to residual hazards, delays in desired site re-use or property transfers, and increased long-term stewardship costs.

Information Management System for Uranium Mill Tailings Sites

DOE is required to conduct long-term surveillance and maintenance of uranium mill tailings sites in accordance with NRC licensing regulations. Information required by NRC regulations includes a detailed description of the final disposal site conditions. frequency and extent of groundwater monitoring, and procedures for site inspections, record keeping and quality assurance (10 CFR Parts 40.27 and 40.28). DOE's Grand Junction Office has developed a document management system to manage more than 50,000 records for nine DOE projects comprising more than 30 DOE sites. Documents in the system contain the following information:

- Present and historical chemical, radioactive, and physical hazards, both natural and man-made, and present and historical releases of contaminants.
- Active and passive devices for preventing exposure to humans and the environment.
- Current (including post-closure) and historical site processes and infrastructure, such as buildings, utilities, pipelines, tanks, and wells.
- Current and historical agreements, regulations, permits, and other legal requirements associated with long-term stewardship.
- Property records related to the site, easements, and other on-site access rights.
- Off-site access rights through public and private property for monitor wells and active or passive control systems, and mineral, water, and other natural resources rights.
- Locations and descriptions of cultural resources and habitats and species of concern.
- Relationship of site resources and access to Native American Tribes or interest groups.
- Site topography, hydrogeology, and geology.
- Site and surrounding property land use.
- Public exposure data.
- Current and historical concerns expressed by the public.

Source: Edge., R. and Pavelka-Zarkesh, L. *Document Systems for Site Stewardship at the U.S. Department of Energy Grand Junction Office*. U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, March 1999.

[84] *Responsible Openness: An Imperative for the Department of Energy*. U.S. Department of Energy, Openness Advisory Panel, Secretary of Energy Advisory Board, August 25, 1997.

7.2 Improving the Ability to Meet Long-term Stewardship Information Needs

The studies cited at the beginning of this chapter identify several recommendations for improving DOE's ability of meet long-term stewardship information management needs. These recommendations, and DOE's efforts to implement them, are discussed below.

- **Develop criteria for identifying critical information**. The first step in such an effort would be to develop a consensus on the types of activities onsite and in the surrounding communities that will require information. The second step would be to identify the information needed to support these activities. The third step would be to develop criteria and guidance for identifying specific site records that meet these information needs. Although complex-wide guidance may ensure a more systematic approach to identifying critical information, individual sites could begin the process independently. Subject matter experts and others (including community members) at each site could identify that subset of current, active records that appear to have long-term value, and site records management organizations could ensure that these records are retained and preserved. Preserving information could provide significant long-term benefit at relatively low cost. In developing the *Report to Congress on Long-term Stewardship at DOE Sites*, DOE has begun to catalogue and report the types of long-term stewardship activities that are to be conducted at its sites in a standardized way. However, the methodology and resulting data apply only to that unique report.

Information Management Systems at the Bureau of Land Management (BLM)

Although BLM does not have a long-term stewardship program in place, their current information management systems and practices have the potential to support long-term stewardship planning and implementation. BLM operates an extensive land use information management system, and possesses expansive current and historical information about land ownership, use, and condition in the United States. The Bureau maintains cadastral survey and historical data on lands patented, along with information on the mineral estate, resource conditions, and permits or leases on Federal lands. BLM also provides other agencies, customers, and the public with efficient and effective means to retrieve and use this information. Preserving records is critical to resolving ownership disputes and are an important source of both historic and resource information.

BLM is using information technology to speed up workflow, improve accuracy, and share information with customers, agency partners, and the public. Determining user requirements, developing systems, collecting and storing data, maintaining systems, and providing for security and training is part of the information technology development process at BLM. BLM uses geospatial tools, including geographic information systems, mapping, remote sensing, and global positioning systems, to acquire and process information. Land managers can use the information to determine the location, extent, and condition of natural resources and to monitor activities on public lands. To respond to demands for faster and more accessible records, the Bureau's land ownership, status, and other records are being automated. Deployment of this automated system, known as the Automated Land and Mineral Record System (ALMRS), began in fiscal year 1998.

Source: U.S. Department of Interior, Bureau of Land Management, *http://www.blm.gov/nhp/what/index.htm*

- **Establish data quality objectives**. It will be important to collect and preserve enough data to support long-term stewardship without overburdening information management systems

with irrelevant information. For example, EPA has developed data quality objectives guidance to assist in focusing data collection and preservation on information critical for environmental decision-making.[85]

- **Establish a clear information baseline at the completion of cleanup**. The baseline information would fully describe the location, condition, and status of all former and residual hazards; a summary of site activities as they pertain to those hazards; and the history of significant public health and environmental impacts to the surrounding communities. This baseline would form the core of information required for long-term stewardship. As noted in Chapter 4, the site-specific long-term stewardship plans required by DOE's Grand Junction Office (GJO) establish an information baseline for sites entering into long-term stewardship, but these plans are required only for closed sites for which GJO has responsibility. In addition, the independent Project Baseline Summaries for long-term stewardship (to be developed by Fiscal Year 2003) will provide a basis for establishing a baseline at many DOE sites (see Chapter 4).

- **Make critical information available to offsite entities**. DOE needs to work proactively with local communities to make information available to allow them to be informed and serve an appropriate role in long-term stewardship. In this way, the information needed for site-specific long-term stewardship activities can be readily identified and utilized as early as possible. This would reduce information management costs during cleanups, help ensure that adequate baselines are established, and ensure that information transfer protocols are established well before all projects at a site are complete. At the same time, sites should work with the offsite entities to improve long-term preservation and access. DOE sites have begun to establish formal agreements to share and disseminate critical information with regulators and local communities. For example, the Rocky Flats Cleanup Agreement among DOE, EPA, the State of Colorado, and several local governments required DOE to create a database of monitoring data and related documents that is accessible to all parties to the agreement. The short-term objective of the database is to improve the effectiveness and efficiency of current monitoring programs, while the long-range goal is to integrate all environmental and natural resource monitoring at the site.[86]

- **Modify existing records retention schedules to meet long-term stewardship information needs**. Federal records retention schedules establish specific requirements for preserving and destroying records, including the length of time records must be retained in an archival repository. Retention times for information critical to long-term stewardship range from essentially zero (information for obsolete facilities and infrastructure is required to be destroyed immediately)[87] to essentially forever (certain records of injuries and residual hazards are required to be retained permanently). Thus, retention times for some critical data should be examined and adjusted to meet long-term stewardship needs. The EM program has

---

[85] *Data Quality Objectives process for Superfund: Interim Final Guidance*, U. S. Environmental Protection Agency, EPA/540/G-93/071, September 1993.

[86] Rocky Flats Cleanup Agreement, Part 23, Sampling and Data/Document Availability. July 19, 1996.

[87] *DOE Records Retention Schedule 14: Design and Construction Drawings and Related Records*, available at *http://www-it.doe.gov/records/doers/doers.html.*

begun discussions with the DOE Chief Information Officer to modify DOE records retention schedules to better meet long-term stewardship needs.

Information Management Requirements for the Proposed Geologic Repository at Yucca Mountain

NRC has proposed licensing criteria for disposal of spent nuclear fuel and high-level radioactive waste in the proposed geologic repository at Yucca Mountain. Prior to permanent closure of the repository, DOE is required to provide to NRC a detailed description of the measures to be employed (e.g., land use controls, construction of monuments, preservation of records) to regulate or prevent activities that could impair the long-term isolation of emplaced waste within the geologic repository and to assure that relevant information will be preserved for the use of future generations. Specific information management requirements include:

- Identification of the site and geological repository operations area by monuments that have been designed, fabricated, and emplaced to be as permanent as is practicable.
- Placement of records in the archives and land record systems of local, state, and federal government agencies, and archives elsewhere in the world, that would be likely to be consulted by potential human intruders–such records to identify the location of the geologic repository operations area, including the underground facility, boreholes, shafts, and ramps, and the boundaries of the site, and the nature and hazard of the waste.
- Preservation and maintenance of geologic, geophysical, geochemical, hydrologic, and other site data that are obtained during the operational period.
- Preservation and maintenance of records of the receipt, handling, and disposition of radioactive waste are required to contain sufficient information to provide a complete history of the movement of the waste from the shipper through all phases of storage and disposal.
- Preservation and maintenance of records of the construction of the geologic repository operations in a manner that ensures their usability for future generations.
- Preservation and maintenance of records associated with a program of material control accounting and accidental criticality reporting.

Each record must be legible throughout the retention period (specified by NRC regulations). The record may be the original or a reproduced copy or a microform provided that the copy or microform is authenticated by authorized personnel and that the microform is capable of producing a clear copy throughout the required retention period. The record may also be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention period. Records such as letters, drawings, and specifications must include all pertinent information such as stamps, initials, and signatures, and DOE is required to maintain adequate safeguards against tampering with and loss of records.

Source: 64 FR 8639, February 22, 1999. Disposal of High-Level Radioactive Wastes in a Proposed Geological Repository at Yucca Mountain, Nevada; Proposed Rule, Nuclear Regulatory Commission, Proposed 10 CFR Parts 2, 19, 20, 21, 30, 40, 51, 60, 61, and 63.

- **Develop appropriate indexing and metadata standards**. The term "indexing" refers to the process of referencing the content of records through keywords, subject codes, and other identifiers. The term "metadata" refers to the content, quality, condition, and other characteristics of data, particularly for electronic formats. Metadata and indexing provide important contextual information, such as where and when data were collected, quality assurance protocols, uncertainties in the data, which is necessary for interpreting and using

information. While certain standard indexing and metadata protocols exist,[88] specific protocols could be developed for DOE issues and residual hazards. The Office of Long Term Stewardship has established a Central Internet Database that provides available information on waste, contaminated media (e.g., water, soil, sediments), spent fuel, materials in inventory, and facilities.[89] The system for referencing these data provides a starting point for developing a more comprehensive referencing system for long-term stewardship data.

Communication Through Time Using Non-Electronic Means

Suggestions on information management presented in this section are intended to supplement, but not replace, existing protocols established by authorities such as the National Archives and Records Administration. Due to the ephemeral nature of electronic technologies, the electronic archiving of long-term stewardship data will not, by itself, provide a secure means to transfer information critical to long-term stewardship to future generations.

The Department intends to use non-electronic means such as monuments and markers to communicate through deep time. For example, DOE will provide archived records, maps, and other information pertaining to the Waste Isolation Pilot Plant in New Mexico to be stored at many locations around the world. At the site itself, DOE also will institute a number of passive controls to warn future generations about the radioactive hazards present in the below-ground repository. These controls will not require continual maintenance, but assume that society in general will maintain some knowledge of the wastes. The controls will include:

- Granite monuments with inscriptions in seven languages.
- A berm surrounding the site that includes radar and magnetic indicators.
- On-site warning markers with information about the waste.
- Informational inscriptions on granite walls.

Source: *Citizens'Guide to the Waste Isolation Pilot Plant Compliance Certification Application to the EPA.* U.S. Department of Energy, Carlsbad Area Office, Carlsbad, NM, November 1996. DOE/CAO-96-1207.

Other organizations have begun to examine approaches for both thinking and communicating across large periods of time. For example, the Long Now Foundation (*http://www.longnow.org*) was established in 1996 to develop the Clock/Library Projects as well as to become the seed of a very long term cultural institution. The foundation is developing a large, mechanical "10,000 Year Clock" to serve as an iconic focal point for thinking about time. The foundation also intends to found a library of and for the deep future to meet the need for content to go along with the long-term context provided by the Clock. The library could become a repository for kinds of information deemed especially useful over long periods of time, such as minding extreme longitudinal scientific studies, or accumulating a 'Responsibility Record' of policy decisions with long-term consequences.

- **Develop a system to facilitate public access to and retrieval of critical information**. A system should be developed to enable a person with limited knowledge of DOE sites to be able to easily search, find, and understand relevant information. An effective system might include both "hard copy" and electronic elements. An effective "hard copy" system might include information centers or displays at the site or in nearby communities; maintenance of

[88]For example, Executive Order 12096, *Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure* requires federal agencies to ensure that all geospatial data are collected in a manner that meets all relevant standards adopted by the Federal Geographic Data Committee, an interagency committee established by the Office of Management and Budget.

[89]Available at *http//cid.em.doe.gov*.

site files in local libraries; and periodic updates of all hard-copy materials and records indexes. An effective electronic system might include (1) an electronic archive where digitized copies of all critical records are kept; (2) an electronic index consisting of a standard thesaurus of reference terms, uniform metadata, and consistent geospatial referencing; (3) a system for delivering electronic copies of records to its patrons; (4) a user interface with a search engine for identifying and locating relevant records; and (5) a maintenance system to ensure that electronic technologies remain current. The Central Internet Database provides a step in this process. The overall system also might include periodic training and education of local librarians and other information management professionals.

- **Integrate information management considerations into all site missions**. Under current business practices, information management is considered a "support" or "overhead" function that is adjunct to DOE site missions. As a consequence, funding to support information management improvement directly competes with funding for accelerated cleanup. This competition is likely to continue until DOE recognizes information management as an integral part of *all* missions, including national security, cleanup, and long-term stewardship. Such recognition could be achieved by creating information management "projects" within the EM program budget and including information management requirements in all business transactions. DOE has not initiated a specific effort to projectize information management. However, the Office of Long Term Stewardship has identified information management as a high-priority science and technology need (see Chapter 4).

7.3 Developing an Institutional Framework for Managing Critical Information

Although DOE sites can take many steps now toward improving information management practices, a more systematic approach may be needed to coordinate and focus efforts throughout the DOE complex. The necessary framework would include an organization, or a network of organizations, which would have the authority, mission, and funding to identify, preserve, and provide access to information critical to long-term stewardship. There are three general options for developing such a framework: dispersed, concentrated, and hybrid (see Exhibit 7-2).

Finding the appropriate balance between local (dispersed) and central strategies for the archival and management of information will be challenging. The architecture of the World Wide Web provides a useful model for discussion – the server(s) upon which databases reside represent the data archive(s); the internet represents the means of accessing data; search engines represent the means of finding data; and desktop computers represent the points of access. It clearly would be advantageous for points of access to be widely dispersed; and search engines can be rapidly updated. The more difficult choice is how to distribute critical information among one or more servers. On the one hand, there appears to be a clear need for one or more central repositories as a backup so that failure of one or more local servers does not result in information loss. A central repository also would provide maximum configuration control over both data and hardware/software requirements. On the other hand, long-term stewardship information needs and preferences for archiving and disseminating this information will be somewhat site-specific, so a degree of flexibility in the design of databases and search engines will likely be needed. This, in turn, would make configuration control more difficult, especially with respect to hardware/software requirements. The ultimate solution is likely to be some type of hybrid

between dispersed and central control, but more dialogue is required before this issue can be resolved.

Exhibit 7-2. Options for an Institutional Framework to Manage Critical Information

Option	Advantages	Disadvantages
Dispersed – multiple, site-specific entities would be responsible for managing information. No central management entity would exist.	Most flexible alternative. The number, structure, and responsibilities of entities could be matched with site-specific needs.	Coordination among numerous entities would be difficult. Difficult to ensure that existing and future requirements, standards, and protocols are being followed. Configuration control would be difficult.
Concentrated – a single, national entity would be responsible for managing information. No site-specific entities would exist.	Most efficient alternative. Relatively easy to maintain standards and practices and to ensure technologies are current. Configuration control would be maximized.	Least flexible alternative. Uniform approach to diverse, site-specific information management needs may not be appropriate.
Hybrid – some information management responsibilities would be concentrated in a single entity; others would be dispersed among multiple, site-specific entities.	Intermediate in terms of flexibility, efficiency, and the need to maintain coordination. A single entity could maintain overall responsibility for managing system (e.g., ensuring standards and protocols are followed; updating technologies). Other entities could be responsible for specific types of information (e.g., local governments could manage real estate records).	

Other federal agencies have established institutional frameworks for managing stewardship information. NRC procedures for transfer of information (10 CFR Part 61.80) provide an approach that could be used to improve information management at DOE sites. NRC requires records to be maintained for the duration of the license. Upon termination of the license, information is to be transferred to local, state, and federal agencies, unless the property is being transferred to another licensee. The NRC draft Standard Review Plan notes that any transfer of land for restricted use by a licensee should be accompanied by a transfer of information and information management procedures for the property.[90] The Bureau of Land Management has established information management systems for Agency land records. The National Park Service has established a Geologic Resources Department to manage data and information for more than 2,400 sites in the Abandoned Mine Lands Program.[91] The Geologic Resources Department is in the process of collecting information for these sites, and the Department is anticipated to remain in operation for the duration of remedial activities at the Abandoned Mine Lands Program sites, which will be at least several decades.

[90]Draft Standard Review Plan 16.0. Nuclear Regulatory Commission, Nuclear Material Safety and Safeguards, Decommissioning Program; 10 CFR Part 61.80.

[91]U.S. Department of Interior, National Park Service, *www1.nature.nps.gov/facts/faml.htm.*

Information Management Systems for Radioactive Waste Disposal Sites

The International Atomic Energy Agency has issued guidance for developing a system for maintaining information pertaining to near surface radioactive waste disposal sites and geologic repositories. The guidance calls for the identification of:

- The types of information of most value to future generations.
- The physical form, location, indexing, and retention schedules for this information.
- Measures to be taken to ensure the continued collection and maintenance of records.
- A schedule for transfer of the collected information into a Records Management System (RMS) during the lifetime of the site.
- Methods to ensure that the information will remain accessible and understandable to future generations.
- Remedial actions to be taken in the event of records deterioration.

The guidance advocates establishing a hierarchal structure of long-term stewardship information for disposal sites, including:

- A Primary Level Information Set, consisting of all of the records continuously developed during the lifetime of the site.
- An Intermediate Level Information Set, consisting of the condensed important documentation that is necessary to ensure an understanding of the disposal site system and the contents and location of the Primary Level Information Set. This data set consists mainly of the records needed to meet the regulatory and licensing requirements of the disposal site.
- A High Level Information Set, consisting of the information sufficient to provide a more fundamental understanding of the disposal system. This data set should provide sufficient information for future generations to make informed decisions concerning the consequences of intentional actions and unforeseen occurrences pertaining to the disposal site.

The rationale for creating a hierarchal structure of information, rather than managing all of the information in a single manner, is to ensure that information most critical to future generations is preserved. A condensed and essential set of data may be more useful and understandable to future generations than a massive archive of both essential and nonessential information that would be provided by a Primary Level Information Set. The guidance advocates national and international archiving of the High Level Information Set to counteract the threats to a single repository of information.

Source: *Maintenance of Records for Radioactive Waste Disposal*. International Atomic Energy Agency, Waste Technology Section, Vienna, Austria. IAEA-TECDOC-1097, July 1999.

Chapter 8: Funding and Financial Management

Estimating future costs for long-term stewardship remains uncertain and will be addressed in the National Defense Authorization Act (NDAA) Report to Congress. The estimates in the NDAA Report will be based on the known or anticipated scope of long-term stewardship activities at individual sites, which, in turn, are based on known or anticipated cleanup end states. The funding options for long-term stewardship will depend partly on the magnitude of estimated long-term stewardship costs. However, regardless of this estimate, some consideration of how long-term stewardship will be funded is warranted. Congress currently funds most environmental cleanup and stewardship activities through annual budget appropriations for the EM program. As EM completes more cleanup, many DOE sites (or portions of sites) will close or transfer to different entities. DOE and other site stewards might have to secure and maintain funding to conduct stewardship activities, but the long-term and uncertain nature of those activities complicates the ability to estimate long-term funding requirements.

APPLICABLE SCOPING COMMENTS
(see Exhibit 2 in Appendix B)

- DOE should describe funding approaches available for long-term assurance oversight without relying on Congressional appropriations (1)
- DOE should seek alternative funding for long-term stewardship in terms of trust funds or endowments, fee-generating schemes, etc. because Congressional appropriations are uncertain (4)
- DOE should explore the option of setting up funding for long-term stewardship separately from operational and programmatic funding for the contractors, and supported by a source not subject to the annual appropriations process (16)
- DOE should consider forming a joint long-term stewardship assessment group involving state and Tribal governments and other stakeholders to independently conduct long-term stewardship under a "trust" funding mechanism (17)
- DOE should not consider decisions requiring institutional controls to be final until an acceptable funding mechanism is implemented (STGWG)

APPLICABLE ISSUES
(see Exhibit 3 in Appendix B)

3. Funding Mechanisms

This chapter reviews DOE's current approach to estimating costs for long-term stewardship. It also examines current funding practices, as well as several alternative approaches.

8.1 Estimating Long-term Stewardship Costs

DOE's current approach to estimating long-term stewardship costs follows the general approach used for developing the DOE's annual budget. DOE field office staff and their contractors prepare annual cost estimates for EM program activities (including long-term stewardship). These cost estimates are developed for individual projects and include either a single, integrated baseline or several interrelated baselines. The project baseline(s) identify objectives, information needs, and performance measures; estimate annual and "life-cycle" costs;[92] and establish overall

[92]The"life cycle" planning horizon for the EM program is currently 70 years. Within this time frame, all EM cleanup projects are anticipated to be complete; however, this time frame is not intended to encompass the life cycle of long-term stewardship, which may be hundreds or even thousands of years.

schedules and major milestones.[93] Sites use a variety of techniques to develop cost estimates for the current 70-year planning time frame, including activity-based cost estimating, parametric estimating techniques, and extrapolations based on current funding levels. EM's baselines provide accurate information on long-term stewardship costs for the 26 sites currently managed by the Grand Junction Office (i.e., sites where the only EM mission is long-term stewardship). At other EM sites, the accuracy and transparency of long-term stewardship cost data vary.

EM's baselines provide a tool for managing cleanup activities more efficiently. They are used to coordinate schedules, identify regulatory compliance requirements, and identify science and technology needs. Similar estimates could assist DOE's long-term stewardship mission to secure and manage its resources efficiently. However, the current approach for estimating life-cycle costs requires more and better data for long-term stewardship than are currently available (Exhibit 8-1).

Exhibit 8-1. Limitations of the Activity-Based Cost Approach for Estimating Long-term Stewardship Costs

- DOE's activity-based cost estimation approach is derived from large capital projects which generally have a well-defined beginning and completion. In contrast, the beginning of many long-term stewardship projects is difficult to determine, and the end of long-term stewardship is difficult to estimate due to the uncertainties in planning that far into the future.
- Activity-based cost estimates become more accurate when there is a clear understanding of the type, number, and timing of activities to be undertaken. The major determinant of the accuracy of cost estimates is where the project is in terms of completion and what uncertainties remain. Cost estimates for some DOE sites (e.g., uranium mill tailings sites managed by the Grand Junction Office) are reasonably accurate because (1) the sites have clearly defined long-term stewardship requirements; (2) cleanups have been completed and the sites already are in the long-term stewardship phase; and (3) mill tailings disposal cells are relatively simple systems compared to other sites.
- Knowledge of historical costs can assist DOE in projecting costs for future stewardship activities. However, DOE's historical cost knowledge is limited because (1) DOE has encountered a limited portion of the long-term stewardship scope that will ultimately be required; and (2) most long-term stewardship costs for work completed to date have not yet been formally defined.
- Long-term stewardship may need to address situations that are not addressed very effectively with activity-based cost estimation techniques. These include non-traditional costs associated with damage to or lost use of environmental resources and changes in long-term stewardship requirements.

Given these data limitations, DOE has undertaken several efforts to improve its ability to estimate long-term stewardship costs:

- **DOE has developed a 'Post-Closure' Project Baseline Summary**. Guidance for preparing the EM life-cycle estimates directs sites to prepare an independent 'post-closure' Project

[93] *Integrated Planning, Accountability, and Budgeting System Information System (IPABS-IS) Guidance*. U.S. Department of Energy, Office of Environmental Management, December 1999.

Baseline Summary (PBS)[94] by Fiscal Year 2003. At sites where this PBS is implemented, as cleanup projects are completed, budget requests, cost estimates, and performance metrics for the follow-on long-term stewardship activities will be shifted into this PBS.[95] This information base will continue to grow as DOE makes more cleanup decisions, completes more cleanup activities, and develops more experience with long-term stewardship. As confidence in the activity-based baseline estimates of long-term stewardship costs increases, DOE may be able to explore efforts to include additional cost factors, including impacts to natural resources, opportunity costs, and benefits of infrastructure re-use.

- **DOE is working to improve cost estimates based on existing data**. DOE recently began to develop and implement a more standardized methodology for defining and estimating long-term stewardship costs based on the Environmental Cost Element Structure (ECES).[96] DOE and other federal agencies developed ECES to provide a consistent framework for estimating and managing environmental management costs. The National Energy Technology Laboratory Center for Acquisition and Business Excellence (CABE) is currently leading efforts to develop separate modules for long-term stewardship. A web-based ECES is also being developed as a data repository for actual environmental management costs, including long-term stewardship. The CABE will maintain the ECES database and perform quality control and analyses on the data as required. In 1999, the Rocky Flats Site developed an activity-based methodology to estimate their annual long-term stewardship costs. DOE's Grand Junction Office develops activity-based annual cost estimates for the long-term stewardship activities it currently conducts at DOE sites. These estimates are based on the requirements and guidance issued under DOE's Order 430.1A, Life Cycle Asset Management.[97]

- **DOE is using available cost estimation techniques**. DOE sites are using cost estimation techniques other than activity-based techniques to develop and improve long-term stewardship cost estimates. One technique is the *level of effort* estimate that considers certain long-term stewardship activities as a maintenance or operating mission rather than a series of individual projects. Another technique is the *parametric estimate* that generates estimates based on historical long-term stewardship costs combined with a set of reasonable

---

[94] A PBS is a management tool used by the EM program for planning, budgeting, and evaluation. The PBS summarizes information on scope, schedule, cost, risk, technical approach, end state, regulatory drivers, safety and health, and performance metrics for each EM program project.

[95] *Integrated Planning, Accountability, and Budgeting System Information System (IPABS-IS) Guidance*. U.S. Department of Energy, Office of Environmental Management, December 1999.

[96] The ECES is the result of an inter-agency effort to develop a standardized method for estimating and tracking environmental management costs. DOE's Applied Cost Engineering (ACE) team has worked with representatives from the EPA and the U.S. Army Corps of Engineers to develop a comprehensive, hierarchical list of work activities (tasks, items, or products) that may be required to accomplish cleanup projects. Its activity-based structure provides a consistent and visible cost management framework, with sufficient detail and coverage of project types, to track project costs and summarize into higher-level cost elements in a standardized fashion. Although additional efforts would be required to adapt ECES to long-term stewardship activities, ECES could serve as a model for developing a Work Breakdown Structure for long-term stewardship.

[97] *1999 Long-term Surveillance and Monitoring Report.* U.S. Department of Energy Grand Junction Office, April 2000.

programmatic assumptions (e.g., factors to adjust for the relative size and complexity of sites and activities).

Given the limitations of available data, considerable uncertainty will be associated with any long-term stewardship cost estimates. DOE could employ statistical uncertainty or scenario analysis to identify this uncertainty more explicitly (i.e., estimate upper and lower bounds for long-term stewardship cost estimates). To develop the upper and lower bounds, DOE could measure the uncertainties related to long-term stewardship costs using statistical tools such as Monte Carlo modeling in a process similar to that used by DOE for the FY 1999 Consolidated Financial Statements (Exhibit 8-2).

Exhibit 8-2. Use of Statistical Analysis to Establish Upper and Lower Bounds for Cleanup Costs

During the formulation of the FY 1999 Consolidated Financial Statement, DOE initially scored the programmatic risks to assign an uncertainty range for each applicable cleanup activity. The approach assumed three key factors influenced cost uncertainty:

- Project definition, the level of site-specific information and engineering available;
- Innovation, the extent to which the project relies on "tried and true" vs. new technical approaches; and
- Complexity, the number of process steps required to execute a project.

Projects with high uncertainty in each of the three factors have the largest range of costs, whereas projects with low uncertainty in each factor have the smallest range of costs. Given cost ranges for each project, DOE used the Monte Carlo simulation to develop a cost uncertainty range for the total life-cycle costs.

8.2 Potential Funding Mechanisms

The long-term and uncertain nature of long-term stewardship activities presents challenges not only for estimating costs but also for identifying sustainable funding mechanisms. This is one of the most frequently identified concerns from DOE advisory groups and the public. DOE's EM program currently requests and receives funds for long-term stewardship activities through the annual federal budget appropriations process. In the short term, this process provides an adequate mechanism for funding ongoing long-term stewardship activities. In the long term, however, several factors could limit the effectiveness of the appropriations process for maintaining a consistent stream of funding. These factors include:

- As site cleanups are completed, the overall budgets for DOE sites may decline dramatically, especially for sites with no remaining mission other than long-term stewardship. In an annual appropriations process, relatively small site budget requests, even if driven by regulatory compliance requirements, may be assigned a lower priority than the higher level budget requests in other areas of government.

- Sites with ongoing missions other than long-term stewardship might seek to re-program long-term stewardship funding to support primary site missions in the event of a budget shortfall.

- Long-term stewardship responsibilities for some DOE sites could be transferred to other federal entities. Under this scenario, long-term stewardship organizations responsible for different sites could wind up competing with one another for funding through the annual federal appropriations process.

- The annual funding process might not readily address unanticipated expenditures related to long-term stewardship. An expenditure "spike" resulting from, for example, a need to mitigate a waste vault failure, might fall outside of the scope of a site's annual appropriations for long-term stewardship. The budget shortfall might not be addressed in a manner timely enough to protect human health and the environment. A consistent, long-term funding stream would allow DOE to set aside contingency funding to address unexpected expenditures.

There are several alternative approaches to funding long-term stewardship, depending upon the entity responsible for conducting the long-term stewardship. This report assumes that the primary responsibility for funding long-term stewardship will continue to be assigned to the federal government, although states, Tribes, local governments, and private parties may assume some financial responsibility for particular sites or parcels of land that are transferred to their control or ownership. Consequently, the funding alternatives discussed reflect the range of options available to DOE or another federal agency.

For this study, DOE identified four types of funding mechanisms that could be used to support long-term stewardship activities at current and former DOE sites. These alternatives are described briefly below and in Exhibit 8-3.

1. *Annual Congressional Appropriations.* DOE would prepare a proposed budget for long-term stewardship that would be submitted to the Office of Management and Budget (OMB). After review and revisions carried out in negotiations among DOE, OMB, the Department of the Treasury, and the Executive Office of the President, a budget for long-term stewardship could be included in the President's budget proposal to Congress. The Committees of the House of Representatives with jurisdiction over DOE would review the budget proposal and could adjust funding levels, increase or decrease funding for particular activities or sites, and add or eliminate programs.

2. *Long-term Stewardship Funds(s)/Escrow Account.* Establishing a long-term stewardship trust fund (or funds) or escrow account would address the uncertainty associated with the annual appropriations process by producing a consistent, predictable funding source for long-term stewardship activities. DOE would need new legislative authority to establish such accounts. Annual funding would be provided from trust fund/escrow account income or escrow account principal. The trust funds or escrow accounts could be created at the national, state or site level. However, a larger number of funds could require larger and more expensive DOE oversight of fund management. The source of the initial funding for the trust fund or escrow account could be derived through a number of mechanisms, including Congressional appropriations and fees or asset sales (see below).

Exhibit 8-3. Potential Mechanisms for Funding Long-term Stewardship

Description	Advantages	Disadvantages
Annual Congressional Appropriations		
• DOE prepares a proposed budget and submits to the Office of Management and Budget (OMB); after review and revisions by OMB and Congress, funding appropriated for long-term stewardship	• Currently in place • Provides process with annual feedback that helps to optimize the amounts of funds provided. • Burden of funding shared by current and future beneficiaries of long-term stewardship activities • Potentially able to respond quickly to unexpected costs or programmatic risks through increases in the next annual appropriation or re-allocation of spending	• High annual transaction costs (e.g., budget preparation) • Short planning horizon • Funding subject to significant uncertainties • May be decreased incentives to fund long-term stewardship as other site missions end
Long-term Stewardship Trust Fund(s)/Escrow Accounts/Investment Fund		
• Funds provided in single-year or multi-year contributions (public or private) • Once appropriated, the monies are typically managed in some type of trust fund • Long-term stewardship activities funded through an earnings stream	• Already familiar (more than 150 of such funds are currently in existence) • Transaction costs would be likely lower • Annual budgets more predictable • Allows multi-year planning and budgeting to take advantage of efficiencies • Ability to respond to unexpected costs or programmatic risks will depend on terms of the trust and the size of the trust's earnings stream	• Requires new statutory authority for initial appropriation and Congressional legislation to allow DOE or site steward to manage fund and use earnings • Difficult to estimate the "correct" funding level accurately (see Section 3.1.1); need to ensure funding levels could be adjusted in later years • Even if the "correct" amount of money is initially funded, invested funds could be managed too conservatively or too aggressively • Money in trust funds can be held back (not spent) in order to balance the federal budget

Exhibit 8-3 (continued)

Description	Advantages	Disadvantages
Fees from DOE Commercial Activity/Sales of Assets		
• DOE or other site stewards use fees generated from commercial activities (e.g., waste treatment or disposal) to fund long-term stewardship • Fee-based approach is more likely to occur under a public-private partnership approach. • DOE or other site stewards allowed to sell property or other site assets (e.g., mineral resources) to pay for long-term stewardship	• Mechanisms to direct the sale of federal assets to specific spending exist and are understood • Sales would raise non-federal funds (i.e., private capital) to pay for long-term stewardship • Deed restrictions could be used to require the new owners to conduct long-term activities • Sales at one site could fund activities at multiple sites	• Congressional action required for a federal agency to conduct commercial activities or to retain asset sale proceeds • Asset sale is a one-time event, whereas long-term stewardship activities occur over a long time; sale proceeds could be insufficient • DOE would need to monitor the site to ensure private parties are in compliance with long-term stewardship requirements • May be large transaction costs associated with asset sales and site monitoring after sales • Difficult to address unexpected costs or programmatic risks because of fixed levels of fees or saleable assets
Public-private partnerships		
• Private entities would be allowed to lease or otherwise use site assets at below-market rates (perhaps with additional subsidies) in return for funding long-term stewardship activities	• Many of the same benefits as asset sales, with more control over assets that are leased vs. sold • Public-private partnerships already exist, have been successful, and would allow re-development of long-term stewardship sites • Deed or lease restrictions can require private, and not federal, funds to pay for long-term stewardship activities	• Congressional action required • DOE would need to monitor the site to ensure private parties are in compliance with long-term stewardship requirements • Allowing development too close to residual hazards is still possible but less likely with an active partnership • Responding to unexpected costs or programmatic risks would be difficult, because it would require re-negotiation of public-private lease or contracts unless all potential contingencies are provided for in advance

3. *Fees from DOE Commercial Activities/Sales of Assets*. DOE would generate revenue by selling property or other site assets (e.g., mineral resources) or by providing services such as waste storage, treatment, and disposal. The receipts from asset sales or fees for services could be collected into a fund that would support long-term stewardship activities on a site-specific or Department-wide basis. However, sales receipts would normally go to the general Treasury unless DOE received new legislative authority to retain the receipts.

4. *Public-Private Partnerships.* Private entities would be allowed to lease or otherwise use site assets at below-market rates (perhaps with additional subsidies) in return for funding long-term stewardship activities. These types of partnerships would require identifying sites with appropriate infrastructure, and then carefully establishing leasing rates that would be make leasing attractive to a private sector entity. Not only would leasing rates take into account the cost of conducting long-term stewardship activities but also the risk associated with maintaining residually-contaminated areas in or around leased facilities. DOE would require new legislative authority to establish public-private partnerships.

Because alternatives 2, 3, and 4 would require specific Congressional action in the form of legislation or specialized appropriations, the viability of these alternatives is dependent upon Congress establishing long-term stewardship as a priority. Congress has provided DOE and other federal agencies with the authority to use alternative funding mechanisms for environmental activities:

Long-term Stewardship Fees

Owners of sites subject to UMTRCA Title II and NWPA section 151(b) must pay a one-time fee to the U.S. Treasury for long-term stewardship. For the UMTRCA sites, the amount was established by NRC and is adjusted annually for inflation – it now is approximately $600,000. DOE does not receive these payments directly; but instead submits a budget request to Congress to pay for long-term stewardship at these sites. These payments are potential sources for contributing to a trust fund for long-term stewardship, but there is no legal mechanism to do so.

- DOE currently contributes to two non-stewardship trust funds supporting future environmental cleanup activities: (1) the Nuclear Waste Fund to support the construction, operation, decommissioning, and final closure of a geologic repository for High-Level Waste and Spent Nuclear Fuel; and (2) the Uranium Enrichment D&D Fund to support the final cleanup of DOE uranium enrichment facilities. Both funds are supported by Congressional appropriations and by fees levied on utilities. The Uranium Enrichment D&D Fund also is the source of Title X Uranium/Thorium Program reimbursement funds. The Title X sites are a subset of the Title II UMTRCA sites, which will revert to DOE for long-term stewardship unless the host state assumes financial responsibility.

- The environmental restoration challenge grants program with the National Fish and Wildlife Foundation (NFWF) is one of the many tools used by the Bureau of Reclamation (BOR) to promote natural resource stewardship on BOR lands.[98] BOR uses challenge grants, where recipients match funds to encourage partnerships among federal agencies, Tribal governments, state and local governments and other organizations, to help leverage funds

[98] *Resource Stewardship 2000*, U.S. Department of Interior, Bureau of Reclamation, *http://www.usbr.gov/stewardship*; *Sowing the Seeds of Success*, National Fish and Wildlife Foundation, 1999.

from many sources. In 1999 the NFWF and BOR awarded 36 grants. Recipients matched funds with an average of 3.5 non-federal dollars for every federal dollar. Non-federal funds come from a variety of sources, including private firms, nonprofit organizations, Tribes, civic groups, and private land owners. All projects receiving these funds must be connected to the resources. BOR administers the funds and must promote natural resource stewardship.

- BLM is working in partnership with the EPA, state agencies, Tribal governments, private parties, and other interested groups to accelerate the rate of cleanup of watersheds affected by abandoned hard rock mines, using the approach outlined in the Interdepartmental Abandoned Mine Lands Watershed Initiative. Based on sources and availability of agency funding, BLM must first focus cleanup efforts on watersheds damaged by abandoned mines rather than on physical hazards associated with these sites. BLM works in collaboration with other government and private landowners in those watersheds to leverage their funds to clean up all sites affecting the watershed.[99]

8.3 Managing Available Funds

The procedures for managing long-term stewardship funds are likely to vary depending on the sources of funding, financial instruments, and contracting strategies. If Congress continues to provide funds through annual appropriations, it is likely there will be little change in current procedures for funding DOE cleanup and associated long-term stewardship activities. Funds will continue to be authorized and appropriated and expended using procurement and grant-issuing procedures. However, different procedures will be required if DOE utilizes alternative funding sources and instruments such as trust funds, commercial activity fees or public-private partnerships. In addition, DOE and site stewards must consider appropriate contracting strategies for conducting long-term stewardship activities.

Several types of financial instruments could be used to manage funds for long-term stewardship. One type of fund with substantial precedent is Federal Trust Funds (Exhibit 8-4). Federal Trust Funds generally are accounting entities whose assets are not held separate from other federal funds or reserved exclusively for the designated purpose. This means Congress can use the funds to pay for other social needs or borrow against their assets. The majority of Federal Trust Funds are seeded with public funding generated through taxes or other user fees. It is unclear whether an analogous tax or user fee system could be established to support long-term stewardship activities. Congress generally requires the tax or user fee to be related to the problem addressed by the trust. The procedures for funding annual expenditures and reinvesting income are specific to each Federal Trust Fund and are established in their enacting legislative language.

[99]U.S. Department of Interior, Bureau of Land Management, Abandoned Mine Lands Program, Frequently Asked Questions, *http://www.blm.gov/narsc/aml*.

Exhibit 8-4. Examples of Federal Trust Funds

- Nuclear Waste Fund (42 U.S.C. § 10222)
- Federal Old Age and Survivors Insurance Trust Fund (42 USC § 401(a))
- Federal Disability Insurance Trust Fund (42 U.S.C. § 401(b))
- Black Lung Disability Trust Fund (26 USC § 9501)
- Aquatic Resources Trust Fund (26 USC § 9504)
- Harbor Maintenance Trust Fund (26 USC § 9505)
- Inland Waterways Trust Fund (26 USC § 9506)
- Airport and Airways Trust Fund (26 USC § 9502)
- Highway Trust Fund (26 USC § 9503)
- Vaccine Injury Compensation Trust Fund (26 USC § 9510)
- Leaking Underground Storage Tank Trust Fund (26 USC § 9508)
- Hazardous Substance Superfund (26 USC § 9507); uses of fund (42 USC § 9611)
- Oil Spill Liability Trust Fund (26 USC § 9509)

A second type of fund is a trust fund held by a regulated financial institution for the benefit of a federal agency. In general, these trusts are established by private sector entities and, therefore, may be applicable only to a subset of long-term stewardship sites depending upon the final site long-term stewardship entity.[100] This type of fund is well-precedented. Trusts of this kind are used in a number of financial assurance programs, particularly for the post-closure care of hazardous waste disposal facilities under RCRA or sites licensed by NRC. They typically are created by a licensee or permittee at the beginning of the licensed activities. The amount of money placed into the fund equals the estimated funds necessary to close the facility or to provide long-term care for the closed facility. This estimate can be adjusted during the life of the trust, thereby requiring further contributions to or releases from the fund. If the licensee or permittee fails to pay the costs of closure or long-term care, the fund trustee is instructed to do so using funds in the trust. Both the principal and income of the fund are available to support expenditures for closure or post-closure long-term care.

Trust funds or "perpetual care investment funds" (Exhibit 8-5) could be established on a nationwide basis, or site-specific basis, provided legislative authority is established to do so. A single national fund would require a huge amount of up-front capital. Although a single fund would generally incur lower transaction costs than many separate funds, a national fund may be more costly to administer because of its larger size and multi-site responsibilities. The allocation of a national fund to multiple sites may be complicated by uncertainty in the types and cost of required long-term stewardship activities and the highly contentious issue of equity (i.e., how much is each site's "share" of a national fund?). It would be difficult to establish a mechanism for determining each site's "share" of such a fund under any circumstances. Unexpected costs or an unexpectedly high rate of spending at a single site might lead to additional concerns about equitable distributions from a single fund. However, improving estimates over time would make it less likely that one or more sites could obtain more than their "share" of a single fund.

[100]Federal regulations at 40 CFR Parts 264.140(c) and 265.140(c) stipulate that states and the federal government are exempt from the RCRA financial assurance requirements.

Improved estimates could include required contingency funding to cover potentially high costs associated with cleanup remedy failure.

Exhibit 8-5. State of Tennessee Perpetual Care Investment Fund

The Tennessee Perpetual Care Trust Fund is an example of a "perpetual care pooled investment fund." The Fund was established pursuant to Tennessee State law (T.C.A. §9-4-603) and is administered by the Tennessee Department of Conservation (TDEC). DOE signed a Consent Order with the State of Tennessee and agreed to deposit $14 million (in $1 million annual installments) into the Fund. Other states may not have the legislative authority to implement such a fund.

The requirements for managing the Fund are established in a Fund Implementation Plan included in the Consent Order. The Plan requires that income from the Fund be used to conduct surveillance and maintenance of the Oak Ridge Reservation Environmental Management Waste Management Facility or other DOE-Oak Ridge Operations Office related activities. The Plan also requires that the principal of the Fund not be used in any circumstances.

The Fund will terminate upon written agreement that surveillance and maintenance for the facility is no longer required. Upon termination, the balance of the fund will be returned to DOE. At this time, DOE and the State disagree on the State's ability to compel DOE contributions to the Fund if Congress does not appropriate sufficient annual funding.

There are two unique features of this agreement:

- After payment of the final installment, interest from the Fund will be used to pay for surveillance and maintenance for the Oak Ridge Reservation Environmental Management Waste Management Facility. This fund is intended as the primary source of long-term stewardship funding, not a "backstop" to DOE funding.

- The State, not DOE, will conduct the surveillance and maintenance using the interest proceeds from the fund.

Regardless of the chosen financial instrument for funding stewardship, DOE and site stewards also must choose effective contracting strategies for conducting long-term stewardship activities. This requires an understanding of both the nature of long-term stewardship activities and the contracting lessons learned by DOE during the 1990s (See Exhibit 8-6). DOE's efforts at contract reform and privatization have demonstrated that the choice of more appropriate contract instruments (e.g. fixed-price contracts, incentive fees) can reduce costs and improve productivity. In general, long-term stewardship activities fall into four types of work:

- Routine, repetitive services (e.g., groundwater monitoring, site security);

- Short-term capital construction projects (e.g., re-constructing a cap, re-installing a groundwater flow barrier);

- Special studies or analyses (e.g., health surveys, groundwater modeling); and

- Long-term institutional knowledge maintenance tasks.

Routine, repetitive services and short-term capital projects are amenable to fixed-price contracting to the extent the service or project is well-defined. In contrast, where the number and type of long-term stewardship activities are uncertain, a fixed-price approach is not appropriate.

It is more difficult to apply performance-based incentives to activities for which there may be no foreseeable completion date. As long-term stewardship activities become more defined, DOE and site stewards can utilize lessons from recent contract reform to reduce the costs of long-term stewardship.

Exhibit 8-6. Contracting Lessons Learned

During the Manhattan Project and throughout the Cold War, DOE and its predecessor agencies secured nuclear weapons research, production, and testing services through broadly-written, cost-reimbursable contracts that relieved contractors of most of the financial risk associated with their work. This approach was seen as necessary given the risks involved in conducting "first-of-a-kind" research and production efforts. However, as the Cold War ended, DOE's missions began to broaden and necessitated new approaches to contracting services. DOE's EM program is an example of a mission focused on the completion of discrete cleanup projects rather than maintenance of large-scale industrial manufacturing capability. The change in missions combined with an increasingly competitive funding environment required DOE to undertake several contracting reform initiatives during the 1990s. As a result, DOE's current best practices for contracting include increased competition, more fixed-price contracts, clearer work scope definitions, multiple contract awards, and performance-based incentives.

Chapter 9: Natural Resources, Cultural Resources, Socioeconomic Impacts, and Environmental Justice

Long-term stewardship is a complex, multi-faceted process that cannot be successfully performed in isolation. Protection of natural resources, protection of cultural resources, and a variety of other environmental, social, economic, and engineering issues are integral to long-term stewardship. The regulatory regime within which DOE performs cleanup and long-term stewardship provides a framework for addressing a number of interrelated environmental and economic issues. This chapter discusses four major environmental, social, and economic issues that will affect long-term stewardship, and the importance of continued partnerships between DOE and affected parties in addressing these issues. Exhibit 9-1 illustrates some of the complex ways in which concerns about natural resources, cultural resources, socioeconomic impacts, and environmental justice affect long-term stewardship.

APPLICABLE SCOPING COMMENTS
(see Exhibit 2 in Appendix B)

- Where cleanup cannot fully restore natural resources, stewardship should be used to address natural resource damage for DOE sites by improving comparable resources (3)
- The study should address impacts to Tribal nations with respect to long-term stewardship (3
- Any acceptable long-term stewardship program must ensure long-term protection of human health, the environment, and cultural resources (STGWG)

APPLICABLE ISSUES
(see Exhibit 3 in Appendix B)

11. Land Use/Natural Resources
16. Sociological/Political Issues
17. Environmental Justice
19. Public Involvement
27. Social/Citizen Control

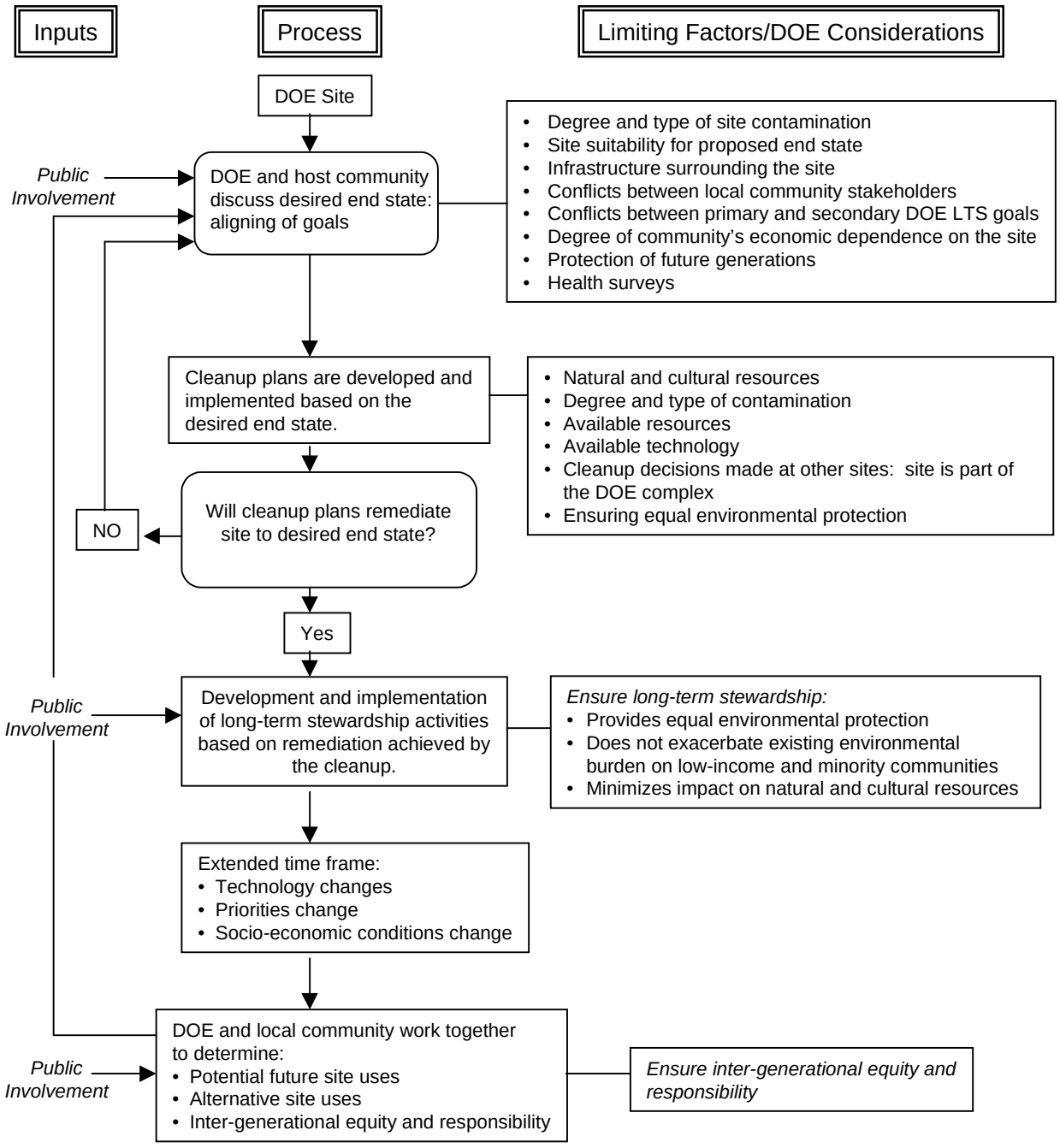
The extent to which long-term stewardship can remain effective will depend in large part on the degree of understanding and appreciation that local communities have for potential environmental risks and benefits and their belief that long-term stewardship activities are being implemented fairly, with input from affected parties. Therefore, a strong public participation role in long-term stewardship will help to:

- Identify and avoid adverse impacts to natural resources and cultural resources.
- Balance the socioeconomic needs of affected parties with DOE's stewardship goals.
- Ensure that federal Indian Trust Responsibilities and federal treaty obligations consistent with the unique legal and political status of Tribes are met.[101]

[101]There are currently 558 federally recognized Tribes in the United States. A federally recognized Tribe is a Tribe and/or Tribal group that has a federally acknowledged legal and political relationship with the federal government. This relationship is referred to as a government-to-government relationship. Several DOE sites have both federally recognized and non-federally recognized tribes. Federally recognized Tribes must be incorporated into DOE decision processes as a governmental entity in accordance with DOE Order 1230.2 and Council of Environmental Quality Memorandum, *Designation of non-Federal Agencies to be Cooperating Agencies in Implementing the Procedural Requirements of NEPA*, July 28, 1999.

- Ensure that long-term stewardship activities do not create or exacerbate disproportionate environmental burdens on low-income and minority populations.

Exhibit 9-1. Environmental and Economic Issues will Affect the Process of Developing and Implementing Long-term Stewardship



Importance of Public Participation in Long-term Stewardship

Successful implementation of long-term stewardship at DOE sites will require a strong partnership with affected parties. Members of the host community may serve as one of the most effective overseers of the stewardship process, given their vested interest in ensuring that stewardship activities continue to be conducted and are appropriate to remaining site risks. A local community that has the opportunity to help develop cleanup strategies and long-term stewardship measures is more likely to support the continued implementation of those measures. As time passes, new generations will need to continuously engage in long-term stewardship planning and implementation to ensure that community involvement remains strong.

Effective public involvement in environmental decision-making involves two-way communication between the public and the agency charged with making the decision. A meaningful public involvement effort needs activities that disseminate information to, gather information from, and exchange information with all stakeholders.

Information distribution activities provide technical information about the issue under consideration (e.g., cleanup remedies, future site uses, desired end state, proposed land use options, and risk management) to all stakeholders. To enable stakeholders to participate in stewardship decisions in a meaningful way, DOE must provide accurate and timely information.

Sources: *Site-Specific Advisory Board Stewardship Workshop Report;* Oak Ridge, TN, October 1999; *Resource Conservation and Recovery Act Public Participation Manual;* U.S. Environmental Protection Agency, 1996.

9.1 Natural Resources

DOE sites are home to diverse and important natural resources,[102] such as biological resources (including fish and wildlife and threatened and endangered species) and wetlands that could be affected by long-term stewardship in numerous ways. Congress has enacted legislation to protect natural resources (Exhibit 9-2). DOE sites implement the requirements included in this legislation by first identifying these resources on the site through various mechanisms such as a biological resource management plan,[103] surveys, and special studies.[104] In its current site planning process, DOE considers the potential impacts of proposed activities on these resources and typically documents its analyses in environmental impact statements and environmental assessments prepared pursuant to NEPA. In some cases, actions taken by DOE and other federal agencies over the past 50 years have enhanced natural resources at DOE sites.[105]

[102] *Survey of Ecological Resources at Selected U.S. Department of Energy Sites;* Pacific Northwest National Laboratory. September 1996.

[103] Some DOE sites have biological resource management plans in place, which establish site-wide policies regarding management of wetlands, habitats of endangered and threatened species, systematic bio-monitoring, wildlife disease, big game, trespass livestock, forest, and wildfire. These plans can be used to identify locations of habitats of endangered and threatened species, environments of migratory birds, Wild and Scenic Rivers Act designated areas, and other environmentally sensitive natural resources. The Hanford site uses Natural Resources Management Plans to protect its resources. These plans are incorporated into the Hanford Comprehensive Land Use Plan, which is a NEPA Record of Decision applicable to DOE. If property is transferred to another federal agency, the new agency will not be legally obligated to follow the conditions of the plan unless that Agency commits to the plan in its own Record of Decision. Also, a non-federal entity would not be bound by the plans unless there are other binding legal commitments (e.g., deed restrictions).

[104] *Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfers*, U.S. Department of Energy, Office of Environmental Policy and Assistance. DOE/EH-413/97/2, October 1997.

[105] *The DOE Presence at the Hanford Site: Benefits to Natural Resources*, Pacific Northwest National Laboratory, November 1996.

Exhibit 9-2. Statutes, Regulations, and Executive Orders Concerning Natural Resources

- Bald and Golden Eagle Protection Act, 16 USC 668-668d et seq.
- Clean Water Act, 33 USC 1251 et seq.
- Coastal Zone Management Act, 16 USC 1451 et seq.
- Endangered Species Act, 16 USC 1531 et seq.
- Executive Order 11990, Wetlands Protection
- Executive Order 11988, Floodplains Protection
- Fish and Wildlife Conservation Act, 16 USC 2901 et seq.
- Marine Mammal Protection Act, 16 USC 1361 et seq.
- Migratory Bird Treaty Act, 16 USC 703 et seq.
- National Environmental Policy Act, 42 USC 4231 et seq.
- Safe Drinking Water Act, 42 USC 300f et seq.
- Wild and Scenic Rivers Act, 16 USC 1271 et seq.

While planning and implementing long-term stewardship activities, DOE will need to avoid additional impacts to natural resources that could result in liability for natural resource damage assessments under CERCLA.[106] Long-term stewardship activities may impact natural resources in a positive or negative way. For example, wildlife (including threatened or endangered species) and their habitat might be protected by the maintenance of a buffer zone around a site or by restricting human access to site segments, thereby creating *de facto* wildlife preserves. On the other hand, wildlife could be adversely affected by fences or other barriers that are erected as a long-term stewardship measure but disrupt foraging or migration patterns.

Role of Tribal Governments in Long-term Stewardship

Tribal governments have a primary role in the enforcement of Tribal laws and regulations that affect long-term stewardship (e.g., Tribal land use and hazardous waste regulations) and in the maintenance of institutional controls such as zoning approvals. Tribal governments also have responsibilities as a trustee of natural resources pursuant to Subpart G of the CERCLA National Contingency Plan (40 CFR Part 300) and as a trustee of cultural resources pursuant to several statutes and Executive Orders (see Exhibit 9-3). Tribal governments also have a special and unique legal and political relationship with the federal government (e.g., treaty rights, the Federal Indian Trust Responsibility) that provides Tribes with a unique role in the management and protection of Tribal lands, assets, resources, and treaty rights. For example, Tribal governments potentially affected by DOE decisions are consulted on a "government-to-government" basis concerning such decisions. Where parcels of land are transferred to Tribal governments (e.g., Los Alamos National Laboratory), Tribal governments may assume additional responsibilities such as ensuring that future uses of these lands are consistent with restrictions necessary to protect human health and the environment. Tribal governments also may assume a more prominent role in managing long-term stewardship information and in promoting education and training to ensure the continuity of long-term stewardship across multiple generations.

Many DOE sites have been removed from the public sector for over 50 years, and at large sites often less than 10 percent of the land area is developed. Due to this situation, large parcels of DOE sites have provided unusual havens for many biota. Decisions to transfer or re-use DOE property could also affect natural resources, depending on the allowable future use of the property. For example, sensitive ecosystems and species may be protected further by creating

[106] 43 CFR Part 11 Natural Resource Damage Assessments.

special reserves within lands owned or controlled by DOE or by transferring those areas to agencies better equipped to manage those resources. The presence of an endangered species within a DOE site could encourage DOE to retain ownership of that land or to transfer the land to another entity that has the mission and means to better preserve such species (e.g., the Department of the Interior, a state wildlife management agency, or even a private land trust organization). As previously discussed, this has been done at a number of DOE sites (see page 36).

EM Policy on Integration of Natural Resources Concerns Into Response Actions

DOE has responsibilities under Executive Order 12580 and Subpart G of the CERCLA National Contingency Plan (40 CFR Part 300) as both a natural resource trustee and lead agency for response actions at sites under the Department's jurisdiction, custody, and control. In fulfilling these responsibilities, the heads of EM program field organizations and program and project managers are required to:

- Evaluate potential risks to natural resources or the services they provide when planning response action investigations and studies.
- Establish appropriate mechanisms for early and ongoing consultation with natural resource trustees, including establishing a natural resource trustee council or including trustee representatives on Site Specific Advisory Boards.
- Coordinate and maintain an ongoing dialogue with the trustees on potential natural resource injuries throughout the remedy selection process.
- Give strong consideration to the selection of response actions that minimize or mitigate adverse impacts to natural resources.
- Seek to obtain, where possible, covenants not to sue for natural resource damages from trustees that may file claims against DOE.
- Specifically identify any injuries to natural resources that may result from implementing the selected response actions, including any irreversible and irretrievable commitments of natural resources, in CERCLA Records of Decision or applicable licenses and permits.
- Use the Department's Natural Resource Trustee Steering Committee as a resource for implementing this policy.

Existing mechanisms for implementing this policy, such as the natural resource trustee councils established at several sites, may not be the way that this policy is implemented during long-term stewardship.

Source: *Policy on Integration of Natural Resources concerns into Response Actions*, Memorandum from Alvin Alm, Assistant Secretary for Environmental Management, U.S. Department of Energy, September 8, 1997.

Partnerships among DOE, other federal agencies, Tribes, and local governments generally have been successful. However, in some cases Indian tribes and local governments have expressed concern about the need for more effective government-to-government interaction prior to land use decisions being made. The Department has recognized these concerns and is committed to more effective coordination with Indian Tribes and local governments.

DOE will need to continually monitor the extent to which long-term stewardship activities affect natural resources. Over time, new resources may be discovered and existing resources may change or be transferred, particularly over the long time periods potentially required for long-term stewardship. For example, species not currently included on the threatened or endangered species list may be added, or species currently on the list may migrate to the site, may recover and be removed from the list, or may become extinct. DOE will need to consider potential

impacts to natural resources and consult with affected parties in any periodic assessment it makes of ongoing long-term stewardship activities.

9.2 Cultural Resources

DOE sites are home to diverse and historically and culturally significant resources. Cultural resources include artifacts and sites dating to the prehistoric, historic, and ethnohistoric periods that are currently located on the ground or buried beneath it; standing structures that are over 50 years of age or are important because they represent a major historical theme or era; cultural and natural places, select natural resources, and sacred objects that have importance for Native Americans and other ethnic groups; and American folklife traditions and arts.[107] Many of these resources are protected by federal laws, regulations, and Executive Orders (Exhibit 9-3). DOE has long recognized its responsibilities for complying with applicable requirements and for managing cultural resources on DOE land and other lands that are impacted by DOE programs.[108] DOE policy and guidance documents provide a framework for implementing these requirements. DOE sites can implement applicable federal cultural resources management requirements through mechanisms such as a cultural resource management plans, *Technical Site Information* documents (described in Chapter 6), NEPA documents, surveys, and studies.[109]

Exhibit 9-3. Statutes, Regulations, and Executive Orders Concerning Cultural Resources

- American Antiquities Preservation Act, 16 USC 431 et seq.
- American Indian Religious Freedom Act, 42 USC 1996 et seq.
- Archeological Resources Protection Act, 16 USC 470aa
- Curation of Federally Owned and Administered Archeological Collections, 36 CFR Part 79
- Determinations of Eligibility for Inclusion in the National Register of Historic Places, 36 CFR Part 65
- Executive Order 11593, Protection and Enhancement of the Cultural Environment
- Executive Order 13007, Indian Sacred Sites
- Historic Sites, Buildings, and Antiquities Act, 16 USC 1461 et seq.
- National Historic Preservation Act, 16 USC 470 et seq.
- Native American Graves Protection and Repatriation Act, 25 USC 3001
- National Register of Historic Places, 36 CFR Part 60
- National Historic Landmarks Program, 36 CFR Part 65
- Protection of Historic and Cultural Properties, 36 CFR Part 800

In its current site planning process, DOE analyzes the potential impacts of proposed activities on these cultural resources and typically documents the analyses in environmental impact statements

[107]This definition was developed in 1989 by DOE's Office of Environment, Safety, and Health in cooperation with staff from the U.S. Department of the Interior, the Advisory Council on Historic Preservation, the National Congress of American Indians, and the Native American Rights Fund.

[108]DOE has issued a wide variety of guidance documents and information briefs over the past decade to raise awareness of cultural resource management requirements (e.g., *Management of Cultural Resources at Department of Energy Facilities*, U.S. Department of Energy Guidance Memorandum, February 23, 1990; *Environmental Guidelines for Development of Cultural Resource Management Plans*, U.S. Department of Energy, Final Report, DOE/EH-501, August 1995).

[109]*Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfers*, U.S. Department of Energy, Office of Environmental Policy and Assistance. DOE/EH-413/97/2, October 1997.

and environmental assessments prepared pursuant to NEPA and in other studies conducted pursuant to other regulatory frameworks. In some instances, National Historic Preservation Act requirements can be combined with the NEPA process. For example, the potential environmental effects of property transfers at the Nevada Test Site and Los Alamos National Laboratory were assessed in NEPA documentation. The respective State Historic Preservation Officers and Tribal Preservation Officers generally review all federal actions subject to NEPA, and information provided by DOE, to determine if any properties have historical significance.

DOE is required by law to consider the effects of its actions, such as implementation of long-term stewardship, on cultural resources. Continued involvement of the Department's Federal Preservation Officer, the State Historic Preservation Officers, Tribal Preservation Officers, local organizations, and Tribal governments will be needed to assure that the value of historic properties, and other cultural resources, is considered during the planning and decision-making processes. To the extent feasible, DOE should implement long-term stewardship in a manner that both continues to protect and provide appropriate access to cultural resources, including historical properties. It may be necessary for DOE to evaluate many competing or conflicting factors related to cultural resources management responsibilities and long-term stewardship activities. For example, cultural and historic resources might be protected by limiting human access to traditional sacred areas;[110] treaty rights to hunt, gather plants, or graze livestock, and the presence of culturally significant resources could also affect plans to implement some long-term stewardship activities; and the transfer, lease, or sale of property out federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance would be viewed as an adverse effect on the property. In some cases, DOE may reconsider or modify proposals to re-use or transfer ownership of an area in which a historic or cultural site is located.[111] In other cases, DOE may decide to transfer an historic or cultural site or to substantially alter or demolish an historic property.[112] Ultimately, DOE's responsibility will be to balance the needs of the agency mission, the public interest in protecting historic properties, the costs of preservation, and other relevant factors.

As a federal agency, DOE must ensure that federal Indian Trust Responsibilities and federal treaty obligations consistent with the unique legal and political status of Tribes are met.[113] Traditional cultural properties, archeological sites, or structures may become eligible for historic preservation or inclusion on the National Register of Historic Places. Access to information regarding the location of many cultural resources may be appropriately restricted in accordance with legal requirements (e.g., the Archeological Resources Protection Act; the National Historic Preservation Act) or specific agreements with Tribal nations. Thus, long-term stewardship plans

[110]Conference call with Los Alamos operations office, November 2, 1999.

[111]For example, the Hanford B Reactor is on the National Register of Historic Places as a nationally significant property. *Source:* National Register of Historic Places, National Park Service.

[112]DOE has this authority as long as the desired action can be justified in support of DOE's mission. However, there are a number of additional statutory and regulatory requirements that would apply. For example, if DOE decides to significantly alter or demolish an historic property, timely steps must be taken to make appropriate records and deposit the records in the Library of Congress or with another appropriate agency designated by the Secretary of the Interior for future use and reference.

[113]DOE Order 1230.2, *American Indian Tribal Government Policy*, outlines the principles to be followed by DOE in its interactions with federally recognized Tribes.

may require protection of resources without specifically disclosing protected information. Requirements to protect cultural resources also may change over time. Treaty reserved rights could be exercised, increasing the amount of land subject to Tribal use.

9.3 Socioeconomic Impacts

The transition from cleanup to long-term stewardship may socially and economically impact affected parties by changing workforce levels and composition, local government resources, access to community services (police, fire, schools, libraries), and housing availability. A decision to close a site and maintain it as a wildlife preserve could adversely affect the number and type of jobs available in the community (such a decision could also increase recreation or tourism opportunities and associated economic benefits) or could affect treaty reserved rights. Similarly, a decision to transfer property for industrial or commercial re-use could maintain or enhance the socioeconomic status quo, or cause job growth and increased pressures on social services and housing. The extent to which DOE decisions affect socioeconomic conditions in a community generally reflects the community's economic dependence on the DOE site. The more diverse a community's economy, the more resilient and adaptable it will be to changing circumstances resulting from DOE decisions.[114]

One of the more significant results of the transition from cleanup to long-term stewardship will be changes in workforce levels and composition. As site missions change, many sites will significantly decrease the demand for highly skilled employees, which could create significant economic disruption in communities that are economically dependent on these jobs. DOE may be able to offset this decrease by transitioning some employees into long-term stewardship activities. However, it is likely that the scale and scope of long-term stewardship activities will be significantly smaller than cleanup activities. DOE also may be able to offset this disruption by attracting private industry to sites, as Mound, Pinellas, and the former K-25 site in Oak Ridge (now the East Tennessee Technology Center) have demonstrated.[115]

[114]Frisch, M., et al. 1998. Regional Economic Benefits of Environmental Management at the U.S. Department of Energy's Major Nuclear Weapons Sites. *Journal of Environmental Management* 54: 23-37; Greenberg, M., et al. 1999. Questioning Conventional Wisdom: the Regional Impacts of Major U.S. Nuclear Weapons Sites, 1970-94. *Socioeconomic Planning Sciences* 33: 183-204.

[115]For example, in 1993, DOE made a decision to close the Pinellas plant in Florida. In 1995, DOE sold the plant to the Pinellas County Industry Council, a non-profit organization created to promote industrial growth. The Council is actively seeking tenants to occupy the facility, and 80 percent of the available space is currently leased. *Source:* www.osti.gov/privatization/report/case12.htm

Re-Use of Pinellas Site

In 1995 the Pinellas Site was sold to the State-chartered Pinellas County Industry Council for industrial redevelopment while site remediation was ongoing. Groundwater remediation is being conducted using a "pump and treat" system, and DOE anticipates that operation of the system will continue until 2014, after which no further remedial action will be required. On-site groundwater monitoring may be required after completion of remediation activities. The sales contract between DOE and Pinellas County includes provisions for a "lifetime easement" for DOE to conduct environmental remediation and monitoring and a similar easement for regulatory agencies to conduct activities on the site. The sales contract sets terms and conditions for potential demolition of buildings and set specifications for decontamination to levels appropriate for an industrial park. The sales contract also requires that the State of Florida acknowledge and concur with the effectiveness of the remediation.

However, the question of identifying the responsible party for remediating contamination that may potentially be discovered on site after the time of sale was not addressed in the sale documents. As of CY 2000, most of the industrial space in the former Pinellas Plant is fully occupied with industrial operations, and there may be situations where site contamination is discovered in the future that cannot be clearly attributed either to DOE's past operations or to current industrial operations.

Sources: Quit-Claim Deed. Pinellas County, Florida, 1995. Pinellas County Office of Records Book 8939, pp. 1357-1358, March 17, 1995; *Sale and Purchase Contract for the Pinellas Plant*. U.S. Department of Energy and Board of County Commissioners, Pinellas County, Florida, 1995. DE-RP04-95A187442, March 17, 1995.

As stated earlier, successful implementation of long-term stewardship activities will require significant participation and support from affected parties. If the affected parties receive socioeconomic benefits from long-term stewardship activities, then there is likely to be a greater degree of cooperation in implementing and enforcing institutional controls. Thus, to the extent feasible, DOE should align long-term stewardship goals with the cultural and economic priorities of Tribes, local governments, and other affected parties. This will enhance the durability and effectiveness of long-term stewardship.[116]

Requirements Mandating DOE Consideration of Socioeconomic Impacts

- DOE Order 4300.1C, Real Property Management, requires analysis of particular impacts before a real property transfer can occur.
- DOE Order 4330.5, Surplus Facility Transfer, requires development of a human resources plan.
- Section 3161 of the National Defense Authorization Act of 1993 requires measures designed to minimize social and economic impacts associated with reconfiguration of the DOE weapons complex.

9.4 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs federal agencies to make environmental justice part of their mission by identifying and addressing disproportionately high and adverse human

[116]Such an alignment does not imply DOE is responsible to provide long-term socioeconomic support to the host community. The alignment could be achieved, for example, if long-term stewardship requirements are compatible with the host community's wish for Lands owned or controlled by DOE to remain as open space and serve as an aesthetic resource within the community.

health or environmental effects of federal programs, policies, and activities on minority populations and low-income populations in the United States.[117]

General Methodology for Evaluating Current and Potential Environmental Justice Concerns

1. Identify the impact from the proposed action to determine adverse environmental and health impacts.
2. Identify the impacted community.
3. Analyze the environmental and health impacts on the community from proposed action.
4. Analyze the socio-economics and demographics of the community.
5. Test for disproportionally high and adverse impact.

The Consortium for Risk Evaluation with Stakeholder Participation has completed an initial analysis of the demographic and economic composition of communities surrounding DOE's 19 major sites and 75 smaller sites. Findings from these studies show that many counties within a 10-mile radius of DOE sites have a higher percentage of minority populations and/or low-income populations than the national average. For example, the study concluded that the 16-county region bordering the Savannah River Site was 41 percent African-American in 1990. This is a higher percentage than typically found in South Carolina, Georgia, or the United States. The study also found that there was a higher percentage of residents living below the poverty line in this region than in the country or surrounding states. In addition, the counties surrounding the Hanford Site have a lower socioeconomic status than in either the host State of Washington or nearby Oregon.[118]

Environmental justice issues can take many forms, but often focus on the geography of risk or burden stemming from environmental hazards, such as the impact of long-term stewardship activities on the host communities and communities that could be exposed to residual site hazards. In developing and implementing long-term stewardship strategies, DOE is directed by Executive Order 12898 to consider the extent to which minority or low-income populations might face disproportionately high and adverse human health or environmental consequences. Disproportionately high and adverse consequences can be caused by a population's geographical location, lifestyle, culture, economic condition, or other elements that increase their vulnerability and susceptibility to environmental burdens. Examples include:

- Lands transferred for industrial development could be located near an existing minority or low-income neighborhood.

- Minority or low-income workers might tend to live in off-site areas that are relatively close to residual site hazards, where property values are lower.

- Minority or low-income populations might receive higher-than-average doses from the consumption of relatively large amounts of freshwater fish from contaminated waters and

[117] Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations.* February 11, 1994.

[118] Greenberg, M. and Simon, D. *Demographic Characteristics of Counties Adjacent to the Savannah River, Hanford, and Other Major U.S. Department of Energy Sites*; Consortium for Risk Evaluation with Stakeholder Participation Report No. 1, March 1996; Greenberg, M. and Simon, D. *Demographic and Economic Characteristics of Areas Surrounding Small DOE Site;* Consortium for Risk Evaluation with Stakeholder Participation Report No. 17, December, 1998.

may also suffer disproportionate impacts because they lack access to adequate medical care or are not provided useable information about risks.[119]

To effectively address stakeholders' environmental justice concerns and ensure that no valid environmental justice concerns remain unaddressed, DOE should find ways to promote opportunities for members of minority and low-income populations to participate in the long-term stewardship planning process. Such opportunities may include providing translation services during public meetings, publication of notices in different media (newspapers, television, radio, or distribution of flyers to community centers or door-to-door), and in different languages, and siting meetings at convenient locations (e.g., accessible by public transportation). With effective public involvement, DOE can ensure that cleanup decisions and long-term stewardship activities consider any environmental justice concerns.

[119]Lazarus, R.J. and Tai, S. Integrating Environmental Justice into EPA Permitting Authority. *Ecology Law Quarterly* 26, 1999; West, P.C. Invitation to Poison? Detroit Minorities and Toxic Fish Consumption from the Detroit River. *In:* Bryant, B. and Mohai, P. (eds). *Race and the Incidence of Environmental Hazards*. Boulder, CO: Westview Press, 1992.

Chapter 10: Sustainability of Long-term Stewardship

Developing and implementing long-term stewardship activities at the national scale and over an extended period of time is an unprecedented task with many uncertainties. No existing institution has yet acquired experience in protecting public health and the environment for the centuries that may be involved in long-term stewardship. Although existing statutory and regulatory requirements provide some guidelines for long-term stewardship activities, it is not clear that they anticipate all of the long-term stewardship measures that may be needed in the future, nor ensure the development of effective implementation strategies.

This chapter discusses several types of issues that may affect the sustainability of long-term stewardship over long periods of time.

APPLICABLE SCOPING COMMENTS
(see Exhibit 2 in Appendix B)

- Long-term stewardship plans should be flexible and take into account future advances in technology and science and future and changes in cultural values and politics; these plans should undergo revisions via a democratic process (4)
- DOE should periodically re-evaluate long-term stewardship plans and implementation programs at both the site and headquarters level to reflect changing conditions (STGWG)

APPLICABLE ISSUES
(see Exhibit 3 in Appendix B)

7. Science and Technology Development
13. Intergenerational Transfer
15. If the Department of Energy Goes Away
20. Roles and Responsibilities
22. Long-term vs. Short-term

It is important to be cognizant of the issues associated with the sustainability of long-term stewardship over many decades and perhaps centuries. DOE recognizes that efforts to define and evaluate these issues are speculative in nature, and the discussion in this chapter is not intended to either direct or impede public debate or to attempt to resolve these issues, particularly as they pertain to specific sites. Nonetheless, the Department believes it is important to note the unique challenges facing long-term stewardship as it moves into the future.

10.1 What is Required for Sustainability?

If long-term stewardship is not designed and managed to be enduring, human health and the environment may be endangered through a variety of means. Society's commitment to long-term stewardship may gradually fade away or be eliminated, causing necessary monitoring and maintenance to lapse. Opportunities for improving the cleanup end state and monitoring and mitigation strategy may be missed at sites where residual hazards become neglected. The public as well as government decision-

Seventh Generation Planning

The Constitution of the Iroquois Nation was drafted as early as 1390 and possibly between 1450 and 1500. It notes the following planning horizon:

> *In every deliberation, we must consider the impact of our decisions on the next seven generations ... Look and listen for the welfare of the whole people and have always in view not only the present but also the coming generations.*

Source: *http://www.axess.com/mohawk/constitution.htm*

makers may come to believe that site hazards have been eliminated. When residual hazards are rediscovered, the ability to address the problems may have declined and the cost needed to do so may increase.

Civilization has had only limited success in planning for and avoiding the consequences of natural disasters like floods, hurricanes, earthquakes, and volcanoes. In some situations, governments have acted to ensure that activities and developments in these areas take into account the hazards, for example, through compliance with stringent building standards or zoning restrictions. Often, however, lessons learned about the hazards are ignored, downplayed, or lost as development occurs following a disaster. In many cases, known hazards are accepted (e.g., people readily move back into homes in floodplains periodically subjected to floods). Approaches to ensure that long-term stewardship remains robust and adaptable must recognize that the future decisions about end states and monitoring and mitigation strategies will reflect not only new scientific and technical information and options, but also the changing values of future generations.

To design long-term stewardship to survive across generations and adapt to profound changes, DOE must address two primary questions:

- How can implementation be structured to ensure that robust and adaptable long-term stewardship endures?

- How can DOE ensure that implementation remains reliable over time?

There are no simple approaches for addressing these issues. However, four principles of intergenerational equity proposed by the National Academy of Public Administration may provide a foundation for ensuring that long-term stewardship endures (Exhibit 10-1).

Exhibit 10-1. The Four Principles of Intergenerational Equity

Trustee Principle – Every generation has obligations as trustee to protect the interests of future generations.

Sustainability Principle – No generation should deprive future generations of the opportunity for a quality of life comparable to its own.

Chain of Obligation Principle – Each generation's primary obligation is to provide for the needs of the living and succeeding generations. Near-term concrete hazards have priority over long-term hypothetical hazards.

Precautionary Principle – Actions that pose a realistic threat of irreversible harm or catastrophic consequences should not be pursued unless there is some compelling countervailing need to benefit either current or future generations.

Sources: *Deciding for the Future: Balancing Risks, Costs, and Benefits Fairly Across Generations*, National Academy of Public Administration, June 1997; *Our Common Future*, The World Commission on Environment and Development (the Brundtland Commission) Oxford: Oxford University Press, 1987, page 43.

10.1.1 Ensuring Survival

Long-term stewardship will face a variety of long-term survival challenges. Future generations may suspend long-term stewardship activities in order to deal with more pressing needs (e.g., economic depression, war).

The long-term survivability of long-term stewardship can be bolstered by local decision-making, active involvement of a wide range of affected parties, and frequent communication across parties at each site. The affected parties located near sites have the most at stake in the success and survival of long-term stewardship. They also will have the best access to certain types of information that should influence evolving site strategies, such as information on changes in land use patterns, property values, and social values. For these and other reasons, long-term stewardship should rely considerably on local decision-making.

Characteristics of an Effective Stewardship Program

According to the National Research Council, "the overarching requirement for an effective stewardship program is that it be reliable. A reliable program has a reasonable likelihood of achieving its objectives over the period it must remain in effect." The NRC identified several characteristics that enhance the reliability and effectiveness of a stewardship program.:

- *Layering and redundancy*. Layering means using several measures to carry out roughly the same function; redundancy means creating a situation in which several entities are responsible for or have a vested interest in the effectiveness of the measures.
- *Ease of implementation*. A stewardship activity must be capable of being put into effect, and it also should be reasonably easy to keep in effect.
- *Monitoring commensurate with risks*. Monitoring methods and schedules need to be commensurate with the harm that could be caused in the case of release of contaminants or failure of a monitoring system.
- *Oversight and enforcement commensurate with risks*. One key stewardship activity is to have a "watchdog" over other stewards and stewardship activities. For the watchdog to be effective, however, it must have teeth.
- *Appropriate incentive structures*. Attention needs to be devoted to assuring that site stewardship managers will be appropriately motivated for carrying out the needed tasks over time..."
- *Adequate funding*. Implementing, monitoring, and appropriately modifying stewardship activities will require adequate and reliable financial resources throughout the activities' required lifetimes.
- *Durability and replaceability*. A stewardship activity should endure either for as long as the site's residual contaminants remain hazardous, or until the activity can be refreshed or replaced by an equally reliable substitute activity.

Source: Long-term Institutional Management of U.S. Department of Energy Legacy Waste Sites. National Academy of Sciences, National Research Council, August 2000.

A centralized institution such as DOE, however, may have the best access to other types of relevant information, such as changes in science and technology, and a greater ability to capture economies of scale in developing and disseminating such knowledge. Therefore, a centralized long-term stewardship institution, focused on activities other than day-to-day work at each site, also appears appropriate.

A certain degree of redundancy could also be beneficial. A wide range of parties have an interest in long-term stewardship, including local residents and businesses; various state, local, Tribal, and federal agencies; site owners and contractors; technology vendors; and advocacy groups. When these parties are directly involved in long-term stewardship, communicate frequently, and understand the importance, goals, and responsibilities associated with long-term stewardship, they can help counteract threats. For example, if a local government agency that has played a key role in long-term stewardship is abolished, the remaining interested parties at the site that have been conducting similar activities can ensure that the functions performed by that agency are transferred or assumed by others.

Frequent communication among stakeholders at a site also can help ensure that new information is widely distributed and its implications are understood and incorporated into future decisions. Likewise, fostering a community of interest groups across sites may help bring expertise and resources to bear if the survival of long-term stewardship is threatened at one site. This benefit may be particularly valuable at sites located in sparsely populated areas or in communities with few resources.

10.1.2 Maintaining Focus

Site stewards need to avoid the perception that the problems at the sites have been solved. Stewardship organizations also should avoid merely ensuring regulatory compliance and implementation of existing monitoring and mitigation strategies. Instead, the organizations should continually seek better solutions and incorporate new developments in science, technology, land use patterns, and societal values. The organizations also should continually learn and reinvent themselves, adapting to changing circumstances, or they will risk becoming irrelevant and targets for elimination. At least two approaches may be used to ensure that the organizations responsible for long-term stewardship remain active and focused on their responsibilities:

- Separate the responsibilities for ensuring regulatory compliance from responsibilities for sponsoring improvements in science and technology. This division would help to ensure that the former goal does not exclude the latter. This approach may increase the difficulty of learning lessons from existing strategies, but establishing appropriate communication paths could mitigate the problem.

- Separate the responsibilities for implementing long-term stewardship from responsibilities to educate the public about the residual hazards at sites and the rationale for long-term stewardship. Educational organizations that focus on transferring institutional knowledge from generation to generation, targeted at communities surrounding DOE sites, could reduce the possibility that remaining site hazards are forgotten.

10.2 The “Rolling Stewardship” Strategy

One of the challenges facing DOE, regulators, and stakeholders is to set in place a long-term hazard management framework that ensures protectiveness of human health and the environment for future generations. Through this hazard management framework, DOE must address

possibilities such as: (1) the remedies established during cleanup will fail (e.g., engineered controls stop working as designed, institutional controls are not enforced); (2) changing circumstances at and around the site will require corresponding changes in long-term stewardship strategies; and (3) future generations will want to change the use(s) of the lands and resources involved in long-term stewardship. Pursuant to the "chain of obligation principle" (Exhibit 10-1), the current generation should always provide the next generation with the skills, resources, and opportunities to cope with any problems that may result from cleanup and long-term stewardship decisions (a "rolling stewardship" strategy).[120]

Education and Training

Education and training will be a critical part of long-term stewardship, particularly among affected parties and will serve to continually reinforce concepts and keep them familiar and pertinent. Enhancing the awareness of (1) why long-term stewardship is necessary, (2) how to conduct long-term stewardship activities, (3) how to evaluate and interpret change, and (4) how to modify activities in response to changing circumstances will enhance the ability of long-term stewardship to survive and adapt to the changing cultural and natural environment.

Education of the public – particularly affected parties – can enhance the effectiveness of institutional controls and the protectiveness of long-term stewardship. Communities that are well educated and trained with respect to long-term stewardship issues are less likely to challenge institutional controls, and more likely to prevent unaware parties (e.g., children, visitors) from putting themselves at risk. Education and training efforts also would help to promote trust between affected parties and site stewards.

The following two principles provide guidance for making decisions that incorporate the "rolling stewardship" strategy:

- **Focus on managing the problem rather than trying to solve the problem**. Given the limitations of present-day technologies and the uncertainties in what we know about residual hazards, the durability of engineered and institutional controls, and what will happen in the future, we cannot expect at the present time to find permanent solutions to all of the problems associated with existing hazards at DOE sites. More permanent solutions may be developed in the future as a result of technological advances.

- **Focus on managing hazards for the near future (e.g., 30-50 years) rather than trying to manage hazards for centuries or millennia**. Given the uncertainties in site conditions and new science and technology, long-term strategies implemented today will need to be re-evaluated and likely changed at regular intervals in the future. Depending on the site characteristics, it may be more productive to develop strategies using a "near-future" time horizon (e.g., 30-50 years, or some other appropriate time frame) than to attempt to develop strategies using a longer time horizon. In other cases (e.g., UMTRCA sites, WIPP), regulations require consideration of longer time frames in designing the facility. However, these regulations acknowledge and address uncertainties associated with these longer time frames.

[120] *Deciding for the Future: Balancing Risks, Costs, and Benefits Fairly Across Generations,* National Academy of Public Administration, June 1997

Two key elements of the "rolling stewardship" strategy, re-evaluating yesterday's decisions, and incorporating new science and technology, are discussed below.

10.2.1 Re-evaluating Yesterday's Decisions

As noted in Chapter 3, decisions made today (and over the next 40 years or more) will have ramifications for the future generations who will be responsible for managing residual hazards. In effect, the present generation is making cost-benefit tradeoffs and committing future generations to managing residual hazards, but future generations are not participating in the decision-making process. The present generation also is committing land and other resources that may be needed or desired for other purposes in the future. Future generations may need to commit additional resources to remediate or otherwise reverse the consequences of decisions made today should they wish to use the land containing the waste management unit for other purposes.

Although the end state conditions resulting from the completion of EM projects will dictate the specific long-term stewardship requirements, issues that may require changes in these requirements include:

- After very long periods of time, residual levels of radionuclides and hazardous organic chemicals will eventually decay/degrade over time to levels that are safe for unrestricted use.

- Demographic and political changes around sites may change exposure pathways or levels of concern. Over the past 50 years, urban development around some sites has dramatically increased, and ecological conditions at others have changed significantly (Exhibit 10-2). Long-term stewardship strategies that are effective today may no longer be effective in the future. For example, the needs for buffer zones and other restricted use areas at sites are likely to change over time as population patterns in the vicinity of the sites evolve.

- Climate change and other geological events may be an issue given that long-term stewardship may be required for hundreds or thousands of years.

Exhibit 10-2. Changing Conditions at and near DOE Sites

Rocky Flats Environmental Technology Site – The population within a 50-mile radius of the site increased from approximately 600,000 in 1950 to more than 2 million today, and this population is expected to increase by an additional 30 percent in the next 20 years. [*From Cleanup to Stewardship*, October 1999]

Savannah River Site – When the federal government purchased the site in 1951, 80-90 percent of the land area was farmland in degraded condition, and wildlife populations had been depleted by nearly 200 years of over-hunting and exploitation. By 1968, more than 100 million trees had been planted on the site. Today, wildlife populations have recovered, and seven percent of the site has been set aside for ecological research. [*Savannah River Site Future Use Plan*, March 1998]

- Future advances in science and technology could reduce long-term stewardship requirements and/or make it possible to clean up existing residual contamination to less restrictive levels. Advances in robotics, for example, might enable future generations to excavate areas that currently pose unacceptable risk to remediation workers.

- Advances in science and medicine may identify new hazards or mitigate existing hazards. A century ago, the effects of ionizing radiation were largely unknown and unsuspected; therefore, a long-term stewardship strategy developed then would not have considered the hazards associated with such radiation. A century from now, medical science may develop treatments that mitigate or reverse the effects of ionizing radiation.

- Cultural and economic values may change over time. Today, the presence of residual contamination generally reduces property values. In the future, limited land availability or concerns over urban sprawl could increase the relative value of property with low levels of residual contamination.

- Changes in on-site plant and animal communities may affect the protectiveness of existing long-term stewardship strategies (e.g., resident species may be listed as endangered or threatened and thus may be subject to special protection).

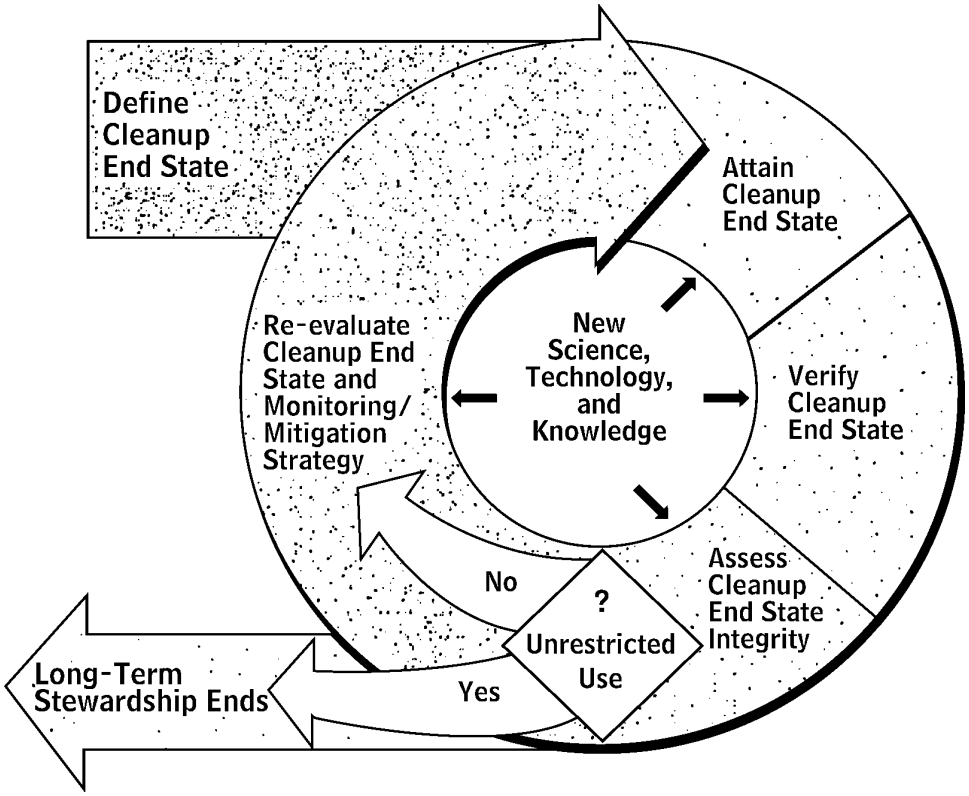
10.2.2 Incorporating Science and Technology Changes into Long-term Stewardship Strategies

Site stewards will need to continually leverage advances in science and technology to reduce costs and risks associated with long-term stewardship activities and to identify more effective ways of managing residual hazards (Exhibit 10-3). The benefits to be gained from advances in science and technology are available only if they are recognized and incorporated into long-term stewardship. The results of research applied to other areas may be applicable to long-term stewardship, but without a mechanism to identify and prioritize technology needs, potential improvements in the ability to meet long-term stewardship needs may be overlooked.

DOE has begun planning to identify new science and technology needs, initiate efforts to meet these needs, and develop the capability to react to scientific advances (see Chapter 4). The requirements for DOE to develop a performance assessment (PA) and composite analysis (CA) for low-level waste disposal facilities (see Chapter 5)[121] may provide a starting point for developing a process and strategy for incorporating science and technology changes into long-term stewardship. Limited by imperfect knowledge and understanding of controlling phenomena, as well as the inability to foresee future events, the PA and CA results may be very uncertain. Therefore, the PA/CA process includes a sensitivity analysis that identifies the parameters contributing most to the long-term risk posed by the facility. These results can be used to focus research and development (R&D) efforts on those areas that would result in the greatest reduction of risk and/or uncertainty. DOE also is required to continually update the PA and CA as new information becomes available. This requirement provides a means for incorporating R&D results into the PA and CA and for identifying new R&D needs.

[121] Pursuant to DOE Order 435.1 *Radioactive Waste Management*.

Exhibit 10-3. The Dynamic Nature of Long-term Stewardship



Changing knowledge and technology will affect cleanup goals and strategies and long-term stewardship activities. Site stewards will need to re-evaluate existing end states and monitoring/ mitigation strategies in response to changing knowledge and technology.

The PA/CA model approach could be applied to long-term stewardship. Site stewards will be limited by imperfect knowledge and understanding of the long-term risks associated with a site and the phenomena controlling these risks. PAs incorporating sensitivity/uncertainty analysis could identify the uncertainties that have the greatest potential for prolonging the duration of the risk or masking the true risk associated with a residual hazard. Given those characteristics, it would be possible to establish priorities for R&D to address long-term stewardship needs. Adopting a requirement to continually update the basis for the site long-term stewardship strategy as new information becomes available would provide a means for incorporating new R&D results into long-term stewardship.

List of Acronyms

AEA: Atomic Energy Act

BLM: Bureau of Land Management

BOR: Bureau of Reclamation

BRAC: Base Realignment and Closure

CFR: Code of Federal Regulations

CSM: Conceptual Site Model

D&D: Decontamination and Decommissioning

DOE: Department of Energy

ECES: Environmental Cost Element Structure

EH: Environment, Safety and Health

EM: Environmental Management

EPA: Environmental Protection Agency

FOSL: Finding of Suitability of Lease

FOST: Finding of Suitability of Transfer

GJO: Grand Junction Office

GSA: General Services Administration

INEEL: Idaho National Engineering and Environmental Laboratory

LCAM: Life Cycle Asset Management

NARA: National Archives and Records Administration

NDAA: National Defense and Authorization Act

NEPA: National Environmental Policy Act

NFWF: National Fish and Wildlife Foundation

NPL: National Priorities List

NRC: Nuclear Regulatory Commission

NWPA: Nuclear Waste Policy Act

OMB: Office of Management and Budget

PBS: Project Baseline Summary

PEIS: Programmatic Environmental Impact Statement

PSO: Principal Secretarial Office

RCRA: Resource Conservation and Recovery Act

UMTRCA: Uranium Mill Tailings Radiation Control Act

WIPP: Waste Isolation Pilot Plant

Glossary

Atomic Energy Act of 1954, as amended (AEA), 42 U.S.C. 2011 et seq.: The federal statute that is the primary source of NRC and DOE regulatory authority.

Baseline: A quantitative expression of planned costs, schedule, and technical requirements for a defined project. Baselines should include criteria to serve as a standard for measuring the status of resources and the progress of a project.

Cleanup: The process of addressing contaminated land, water, and facilities; nuclear materials and spent nuclear fuel; and waste produced by past nuclear weapons production activities in accordance with applicable requirements. Cleanup does not imply that all hazards will be removed from the site. This function encompasses a wide range of activities, such as stabilizing contaminated soil; treating groundwater; decommissioning process buildings, nuclear reactors, chemical separations plants, and many other facilities; exhuming sludge and buried drums of waste; and treating and disposing of waste. The term "remediation" is often used synonymously with cleanup.

Code of Federal Regulations (CFR): A document containing the regulations of Federal departments and agencies.

Composite Analysis (CA): An analysis that accounts for not only the radioactivity in the disposal facility, but all other sources of radioactivity at the site that could contribute to an overall exposure should a failure occur.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, 42 U.S.C. 9601 et seq.: A federal law (also known as Superfund), enacted in 1980 and reauthorized in 1986, that provides the legal authority for emergency response and cleanup of hazardous substances released into the environment and for the cleanup of inactive waste sites.

Conceptual Site Model (CSM): A set of qualitative assumptions used to describe a system or subsystem for a given purpose. CSMs are used during cleanup actions to depict the relationship between existing hazards, environmental transport mechanisms, exposure pathways, and ultimate human and ecological receptors. CSMs can also be used to distinguish between known and unknown site conditions (e.g., the existence of fractured bedrock or preferential pathways for groundwater flow).

Contingency Plan: Preparations for unexpected or unwanted circumstances (e.g., engineered control failures, environmental change, etc.).

Cultural Resources: Include artifacts and sites dating to the prehistoric, historic, and ethnohistoric periods that are currently located on the ground or buried beneath it; standing structures that are over 50 years of age or are important because they represent a major historical theme or era; cultural and natural places, select natural resources, and sacred objects that have importance for Native Americans and other ethnic groups; and American folklife traditions and arts. Many cultural resources are protected by Federal laws and regulations, including the

American Antiquities Preservation Act, 16 USC 431 et seq.; the Archeological Resources Protection Act, 16 USC 470a.; Executive Order 11593, Protection and Enhancement of the Cultural Environment; Executive Order 13007, Indian Sacred Sites; the National Historic Preservation Act, 16 USC 470 et seq.; and the National Historic Landmarks Program, 36 CFR Part 65.

Decommissioning: The process of removing a facility from operation followed by decontamination, entombment, dismantlement, or conversion to another use.

Disposition: Reuse, recycling, sale, transfer, storage, treatment, or disposal.

DOE Orders: Internal requirements of the DOE that establish policy and procedures, including those for compliance with applicable laws. DOE Orders are established by DOE under the authority of the AEA, and are not enforceable by external parties (e.g., regulators).

End State: The physical state of a site after agreed upon remediation activities have been completed.

Engineered Control: Includes radioactive, hazardous, and sanitary landfills; vaults; repositories; in-situ stabilization; caps on residual contamination; or other man-made controls designed to isolate or contain waste or materials.

Environmental Contamination: The release into the environment of radioactive, hazardous, or toxic materials.

Environmental Justice, Executive Order 12898: The fair treatment of people of all races, cultures, incomes, and educational levels with respect to development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment implies that no population of people should be subject to disproportionate negative environmental impacts of pollution or environmental hazards. The methodology for addressing environmental justice is laid out on p.101.

Environmental Management (EM): An Office of DOE that was created in 1989 to oversee the Department's waste management and environmental cleanup efforts. Originally called the Office of Environmental Restoration and Waste Management, it was renamed in 1993.

Exposure Pathway: The course a chemical or physical agent takes from the source to the exposed organism; describes a unique mechanism by which an individual or population can become exposed to chemical or physical agents at or originating from a release site. Each exposure pathway includes a source or a release from a source, an exposure point, and an exposure route.

Federal Facilities Compliance Act of 1992, 42 U.S.C. 6961 et seq.: The Act makes DOE subject to fines and penalties for violations of RCRA and requires DOE to adhere to state, interstate, and local government hazardous and solid waste management requirements. The Act also defines "mixed" radioactive and hazardous waste as being subject to both Atomic Energy Act and RCRA requirements.

Half-life: The time it takes for one-half of any given number of unstable atoms to decay to another nuclear form. Each isotope has its own characteristic half-life. They range from millionths of a second to billions of years.

Hazards: Materials or conditions that have the potential to cause adverse effects to health, safety, or the environment.

Hazardous Waste: A category of waste regulated under the Resource Conservation and Recovery Act (RCRA, 42 U.S.C. 6901 et seq.). To be considered hazardous, a waste must be solid waste under RCRA and must exhibit at least one of four characteristics described in 40 CFR Part 261.20 through 40 CFR Part 261.24 (i.e., ignitability, corrosivity, reactivity, or toxicity) or be specifically listed by the Environmental Protection Agency in 40 CFR Part 261.31 through 40 CFR Part 261.33. Source, special nuclear, or by-product materials as defined by the Atomic Energy Act are not hazardous waste because they are not defined as solid waste under RCRA.

High-Level Waste (HLW): Highly radioactive waste material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid materials derived from such liquid waste that contains fission products in sufficient concentrations; and other highly radioactive material that is determined, consistent with existing law, to require permanent isolation.

In-situ: In its natural position or place.

Institutional Controls: Non-engineering measures - usually, but not always, legal controls - intended to affect human activities in such a way as to prevent or reduce exposure to hazardous substances. Examples of institutional controls are on page 43.

Ionizing Radiation: Any radiation capable of displacing electrons from an atom or molecule, thereby producing ions.

Isotopes: Any of two or more variations of an element in which the nuclei have the same number of protons (i.e., the same atomic number) but different number of neutrons so that their atomic masses differ. Isotopes of a single element possess almost identical chemical properties, but often different physical properties (e.g., carbon-12 and carbon-13 are stable, carbon-14 is radioactive).

Intergenerational Equity: A concept that emphasizes the importance of considering future impacts and consequences when making decisions; likewise, future generations should not be unnecessarily or disproportionately burdened by current-day decisions.

Land Use Control Assurance Plans (LUCAP): A written installation-wide plan that sets out the procedure to assure land use controls remain effective over the long-term for all areas at the particular installation where they are required.

Life-Cycle Cost Estimate: All the anticipated costs associated with the project or program alternative through its life. This includes costs from pre-operations through operations and post-operations stewardship.

Long-term Stewardship: All activities required to protect human health and the environment from hazards remaining after cleanup is complete.

Low-level Waste: Radioactive waste that is not spent fuel, high-level waste, transuranic waste, byproduct material (as defined in section 11e.(2) of the Atomic Energy Act of 1954), or naturally occurring radioactive material.

Metadata: Refers to the content, quality, condition, and other characteristics of data, particularly for electronic formats. Metadata (and indexing) also provide important contextual information, such as where and when data were collected, quality assurance protocols, and uncertainties in the data, which is necessary for interpreting and using information.

National Environmental Policy Act (NEPA), 42 U.S.C. 4321 et seq: A Federal law, enacted in 1970, that requires the Federal government to consider the environmental impacts of, and alternatives to, major proposed actions in its decision-making processes.

Natural Attenuation: A process that reduces the risk of hazards through three possible mechanisms: 1) transform contaminants to a less toxic form through destructive processes (e.g., biodegradation, radioactive decay); 2) reduce potential exposure levels by lowering concentration levels (e.g., dilution, dispersion); or 3) reduce contaminant mobility and bio-availability by sorption to the soil or rock matrix.

Natural Resources: Includes, but is not limited to, biological resources (fish and wildlife), threatened and endangered species, groundwater, water rights, mineral rights, timber, and wetlands. Natural resources are protected by Congressional legislation, including the Clean Water Act, 33 USC 1251 et seq.; Endangered Species Act, 16 USC 1531 et seq.; Executive Order 11990, Wetlands Protection; the Fish and Wildlife Conservation Act, 16 USC 2901 et seq.; the National Environmental Policy Act, 42 USC 4231; and the Safe Drinking Water Act, 42 USC 300f et seq.

Performance Assessment (PA): An analysis that predicts the behavior of a system or system component under a given set of conditions.

Project Baseline Summary (PBS): A management tool used for planning, budgeting, and evaluation that summarizes information on scope, schedule, cost, risk, technical approach, end state, regulatory drivers, safety and health, and performance metrics for each EM program project.

Principal Secretarial Office: A program reporting to the Secretary of Energy. Includes over 25 offices, including the Office of Environmental Management; Office of Defense Programs; Office of Environment, Safety, and Health; and Office of Science.

Radioactivity: The spontaneous transformation of unstable atomic nuclei, usually accompanied by the emission of ionizing radiation (decay).

Radionuclide or Radiosotope: An unstable isotope that undergoes spontaneous transformation, emitting radiation.

Real Property: Includes land and structures on the land such as buildings, mission-related infrastructure, waste disposal facilities, and other waste management units. For the purpose of long-term stewardship,

real property also includes groundwater, surface water, natural resources, and cultural resources; however, rights to water and mineral resources may be managed differently than surface property rights.

Receptor: Any human or other living thing that could be exposed and/or threatened by hazardous or toxic contaminants.

Record of Decision (ROD): A public document that records the final decision(s) concerning a proposed agency action. RODs may be prepared in accordance with requirements of the Council on Environmental Quality NEPA regulations (40 CFR Part 1505.2). or pursuant to CERCLA and the National Contingency Plan. A NEPA ROD identifies the environmentally preferable alternative(s), factors balanced by the agency in making the decision, whether all practicable means to avoid or minimize environmental harm have been adopted, and, if not, why they were not. A CERCLA ROD is a public document that records a final decision in a remedial action process, such as selection of a remedial action.

Remedy Monitoring Plan (RMP): A plan that is used to identify the objectives, schedules, information, procedures, technologies, necessary personnel, etc., to ensure the continued effectiveness of a remedy. RMPs can include evaluation of the compliance of the remedy with applicable standards; continued performance of the design, operation, and maintenance of the remedy; and continued maintenance of the land use upon which the remedy selection was based. RMPs are established as part of remedy decision documents.

Resource Management Plan: A management strategy for the conservation of biological (e.g., fish, wildlife, plants) or cultural (e.g., historically significant buildings, sites, objects) resources. Its primary purpose is to provide DOE and its contractors with a consistent approach to protect resources and to monitor, assess, and mitigate impacts from site development, cleanup or restoration activities.

Risk: Risk requires the presence of a hazard, but adds to the hazard the probability that the potential harm of undesirable consequences will be realized upon exposure of a receptor to the hazard. Risk is expressed (qualitatively or quantitatively) in terms of the likelihood that an adverse effect will occur as a result of the existence of the hazard. The existence of a hazard does not automatically imply the existence of a risk since risk requires a pathway (to a receptor) for an exposure to occur.

Spent Nuclear Fuel: Fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been chemically separated. Spent nuclear fuel also includes uranium/neptunium target materials, blanket assemblies, pieces of fuel, and debris.

Transuranic Elements: All elements beyond uranium on the periodic table, including neptunium, plutonium, americium, and curium.

Unrestricted Use: Land use status upon which there is no restriction on the types of activities that may occur, including permanent residential use.

Uranium Mill Tailings: Tailings or waste produced by the extraction or concentration of uranium or thorium from ore for the source material content. Mill tailings are one type of byproduct material, and typically contain about 85 percent of the radioactivity present in unprocessed ore.

Uranium Mill Tailings Radiation Control Act of 1978, 42 U.S.C. 7901 et seq.: The Act that directed the Department of Energy to provide for stabilization and control of the uranium mill tailings from inactive sites in a safe and environmentally sound manner to minimize radiation health hazards to the public. It authorized the Department to undertake remedial actions at 24 designated inactive uranium processing sites and at an estimated 5,048 vicinity properties.

Appendix A History of Long-term Stewardship and Events Leading to the *Draft Study*

History of Long-term Stewardship as an Issue for DOE

Prior to 1995, Congress and the public assumed that DOE generally was cleaning up its sites to levels appropriate for unrestricted use. However, the 1995 and 1996 Baseline Environmental Management Reports acknowledged that no feasible remediation strategy was available for certain hazards at DOE sites. The Baseline Reports suggested that site cleanup strategies and remedial endpoints for some sites were closer to "brownfields" than "greenfields." The report *Paths to Closure* also acknowledged that DOE has no remediation plans for certain types of residual hazards (e.g., entombment vs. demolition of many facilities), and concluded that long-term stewardship would therefore be needed at DOE sites to manage residual hazards. The report *From Cleanup to Stewardship*, published in October 1999, began to examine national policy issues, challenges, and barriers associated with the transition from cleanup to long-term stewardship and provided a summary of the nature and extent of DOE's long-term stewardship responsibilities. Advisory groups and non-DOE entities that have also identified long-term stewardship issues and/or provided recommendations to DOE include individual state, Tribal, and local governments, Site Specific Advisory Boards, the State and Tribal Governments Working Group (STGWG), the National Association of Attorneys General, and the Environmental Management Advisory Board (EMAB).

The PEIS Settlement Agreement

In 1998, the Natural Resources Defense Council and 38 other plaintiffs reached a Settlement Agreement with DOE (*Joint Stipulation: Natural Resources Defense Council et. al. v. Richardson et. al. Civ. No. 97-963 (SS) December 14, 1998*). The text of the Settlement Agreement can be found at *http://lts.apps.em.doe.gov*.

The PEIS Settlement Agreement contains three elements:

1. DOE was required to establish a Central Internet Database of information on waste, contaminated media (e.g., water, soil, sediment), facilities, and waste transfers. Data in the Central Internet Database is limited to available site data, and the Settlement Agreement required public participation in its development.

2. DOE was required to prepare a Study on long-term stewardship (Exhibit A-1). The Settlement Agreement requires DOE to conduct a scoping process for the *Draft Study* in accordance with Council on Environmental Quality (CEQ) regulations, and to conduct the public review process for the Final Study in accordance with DOE NEPA regulations.

3. DOE was required to allocate $6.25 million in funds for citizen monitoring and technical assessment for eligible organizations to procure technical expertise to review DOE Environmental Management activities. Any nonprofit organization, non-governmental

organization, or tribal organization group is eligible for funding. RESOLVE was selected as the "Administering Organization" for the funding.

Exhibit A-1. Language from PEIS Settlement Agreement Pertaining to Long-term Stewardship Study

> "DOE will prepare a study on its long-term stewardship activities. By "long-term stewardship," DOE refers to the physical controls, institutions, information and other mechanisms needed to ensure protection of people and the environment at sites where DOE has completed or plans to complete "cleanup" (e.g., landfill closures, remedial actions, removal actions, and facility stabilization). This concept of long-term stewardship includes, *inter alia*, land-use controls, monitoring, maintenance, and information management. While DOE's study on long-term stewardship will not be a NEPA document or its functional equivalent, DOE will, nevertheless, follow the procedures set forth in the regulations of the President's Council on Environmental Quality (CEQ) for public scoping, 40 C.F.R. § 1501.7(a)(1)-(2), and the procedures set forth in DOE's NEPA regulations for public review, of environmental impact statements (EIS's), 10 CFR § 1021.313, except that (a) DOE will not transmit the study, in draft form, to EPA, and DOE (not EPA) will publish a Notice of Availability in the Federal Register, as set forth in 10 C.F.R. § 1021.313(a); and (b) DOE will not include any Statement of Findings as set forth in 10 C.F.R. § 1021.313(c). In the study, DOE will discuss, as appropriate, alternative approaches to long-term stewardship and the environmental consequences associated with those alternative approaches."

Relationship Between the Background Document, the *Draft Study*, and the National Defense Authorization Act (NDAA) *Report to Congress*

The Background Document *From Cleanup to Stewardship* provides background information for the long-term stewardship study scoping process required by the PEIS Settlement Agreement. The Background Document provides an overall summary of the nature and extent of current and anticipated long-term stewardship needs at all DOE sites. The Background Document also summarizes available information about the number and location of sites that will likely require long-term stewardship by DOE, the type of long-term stewardship activities likely to be required, and the DOE sites at which long-term stewardship activities are currently being conducted. DOE used this information to identify sites where contaminated facilities, water, soil, and/or engineered units would likely remain after cleanup is complete, and to estimate the scope of long-term stewardship activities needed.

DOE prepared the *Draft Study* pursuant to the terms of the Settlement Agreement, to meet the commitment made in the Background Document, and to respond to insights provided by the public during a recently completed public scoping process. The *Draft Study* is not directly related to the other two elements of the Settlement Agreement. The funding allocated by DOE for citizen monitoring and technical assessment is not being used to support preparation of the *Draft Study*. The *Draft Study* is being prepared independently of the Central Internet Database, which contains site-specific information concerning DOE facilities. The *Draft Study* does not analyze site-specific issues, but analyzes the national issues that DOE needs to address in planning for and conducting long-term stewardship activities. The *Draft Study* promotes exchange of long-term stewardship information between DOE and non-DOE agencies and organizations, including Tribal nations, state and local governments, and private citizens. The *Draft Study* will inform future DOE site and national programmatic decision processes affected by long-term stewardship issues.

The National Defense Authorization Act (NDAA) *Report to Congress* is the third important building block for developing DOE's long-term stewardship program. While the *Draft Study* and Background document address long-term stewardship issues on a broad, complex-wide scale, the *Report to Congress* addresses DOE's long-term stewardship requirements on a more site-specific, detailed scale. The report is currently being prepared and is anticipated to be released in October 2000. As the title implies, the report was requested by Congress during its consideration of the National Defense Authorization Act of 1998. The *Report to Congress* will:

- Identify sites or portions of sites where environmental restoration, waste disposal, and facility stabilization will be completed by 2006 without unrestricted land use.

- Include sufficient detail to undertake the necessary management and stewardship responsibilities, including cost, scope, and schedule.

Appendix B How DOE Identified the Study Scope

How DOE selected the overall scope and issues that are addressed in the study

DOE developed the overall scope and issues that are addressed in the *Draft Study* based on the comments received through the scoping process, ongoing work on long-term stewardship being conducted by DOE and non-DOE organizations, and requirements of the PEIS Settlement Agreement. DOE headquarters and field organizations have been working with DOE organizations, state and federal regulatory agencies, and national and local stakeholder organizations to identify and address long-term stewardship issues. Stewardship issues have been identified by DOE as part of the Department's cleanup, economic re-development, and facility disposition programs. DOE has identified and is addressing long-term stewardship issues and statutory requirements through the development of complex-wide and site-specific guidance, site-specific agreements, and site-specific and organization-specific programs. Examples of these documents are discussed in this Appendix and referenced throughout the *Draft Study*. The long-term stewardship issues that DOE has identified and is addressing through these documents provides a basis for the overall scope and the specific issues addressed in the *Draft Study*.

The scoping comments received from DOE stakeholder organizations and the public raised a number of broad long-term stewardship issues, including: complex-wide and site-specific planning; long-term provision of engineered and institutional controls; residual hazard management; alternative long-term funding mechanisms; life-cycle cost estimation; information management; natural resources management; cultural resources management; and compliance oversight. Scoping commenters also specifically requested that DOE consider recommendations on long-term stewardship issues that have been developed by advisory groups and non-DOE organizations. DOE has integrated the long-term stewardship issues identified in the scoping comments with the issues that have been identified through DOE's ongoing long-term stewardship work in developing the overall scope and specific issues for the *Draft Study*. Each chapter of the *Draft Study* focuses on a single broad issue of long-term stewardship.

The scoping process and how scoping comments were incorporated into the study

DOE published a Notice of Intent (NOI) to prepare a study on long-term stewardship in the October 6, 1999 Federal Register (64 FR 54279). The NOI described the goals of the study and development process for the study. The NOI also described the study scoping process and established the formal period during which DOE would accept scoping comments. Initially, the formal scoping period for the study was October 6, 1999 to January 4, 2000. In response to public comment, DOE extended the scoping period from January 4, 2000 to February 3, 2000. The notice of extension for the scoping period was published in the December 29, 1999 Federal Register (64 FR 73027.) DOE developed a background document for the study: *From Cleanup to Stewardship, A Companion Report to `Paths to Closure' and Background Information to Support the Scoping Process Required for the 1999 PEIS Settlement Study*. Notification of the publication of the Background Document was included in the Notice of Intent.

In accordance with the terms of the settlement agreement, DOE followed the President's Council on Environmental Quality (CEQ) procedures for public scoping, 40 CFR 1501.7(a)(1)-(2), even though the study is not a NEPA document or its functional equivalent. The public scoping process provided interested parties with opportunities to learn about the goals of the study and review background information related to the study. The public scoping process also provided DOE with input about the topics and issues that should be included in the *Draft Study*, within the general parameters established by the settlement agreement.

DOE conducted a public scoping workshop October 28, 1999 in Oak Ridge, TN to provide an opportunity for information exchange and constructive discussions between DOE and interested parties on the types of issues DOE should examine in the study. The public scoping workshop was scheduled to coincide with the 1999 annual Site-Specific Advisory Board (SSAB) National Stewardship Workshop held October 25-27, 1999. A public notice for the public scoping workshop was published in the October 7, 1999 Federal Register (64 FR 54624.) At the public workshop, DOE staff discussed the study process and objectives, described how public input will be incorporated into the study, and addressed questions. The facilitated workshop provided the means for interaction among the participants so as to promote a thorough, open discussion of long-term stewardship issues.

In addition to the public workshop, DOE pursued other opportunities to inform the public about the study and scoping process throughout the scoping period. DOE distributed the Background Document and other relevant information to existing forums and entities, including the Environmental Management Advisory Board (EMAB,) Site-Specific Advisory Boards (SSABs,) State and Tribal Governments Working Group (STGWG,) and other stakeholder organizations. DOE also conducted public presentations concerning the *Draft Study* at many locations throughout U.S. (see Exhibit B-1). DOE also published the Background Document and other information relevant to long-term stewardship on the Internet Web Site (*http://lts.apps.em.doe.gov/lts*). DOE solicited comments through its Internet Web Site and by postal mail and fax to the DOE Study Project Manager.

DOE received scoping comments from 18 commenters (Exhibit B-2). DOE reviewed and considered all scoping comments and other suggestions. These comments and suggestions were integrated with ongoing DOE work to determine the overall scope and issues to be included in the *Draft Study*. DOE made a concerted effort to address every substantive comment received. The *Draft Study* does not address site-specific issues except as examples in the context of presenting national issues. Therefore, site-specific scoping comments have been incorporated into the *Draft Study* scope only to the extent feasible in the context of national long-term stewardship issues. Comments that were received by DOE after the closing date of the formal scoping process (February 3, 2000) have been considered in the *Draft Study* to the extent practicable considering schedule constraints. Exhibit B-2 provides a summary of each scoping comment and where the comment is addressed in the *Draft Study* (or whether DOE considered the comment to be out of scope for the *Draft Study*). The *Draft Study* also identifies the scoping comments addressed in each chapter.

At the public workshop, DOE identified a number of issues regarding long-term stewardship that had been raised during the past few years. The workshop participants identified a number of

additional issues pertaining to long-term stewardship. The combined list of 27 issues was included in subsequent briefings used at the public presentations noted above. Exhibit B-3 lists these 27 issues and where they are addressed in the *Draft Study* (including those considered out of scope).

Other factors that led to the identification of issues addressed in the study

DOE considered the ongoing work on long-term stewardship that is being conducted within DOE organizations to determine the issues addressed in the *Draft Study*. The Grand Junction Office, Oak Ridge Operations Office, Richland Operations Office, and other DOE organizations are already conducting long-term stewardship activities at sites or portions of sites for which cleanup has been completed, both in response to statutory requirements and to the conditions of negotiated site-specific agreements. The *FY 2000-2001 Idaho National Engineering and Environmental Laboratory Institutional Plan* prepared by the Idaho Operations Office describes INEEL's role as the lead laboratory for DOE's efforts to incorporate new science and technology into long-term stewardship. Long-term stewardship activities are also addressed in site-specific DOE documents, including the *1999 Long-Term Surveillance and Maintenance Report* prepared by the Grand Junction Office, and the *WIPP Compliance Certification Application* prepared by the DOE National Transuranic Waste Program Office.

DOE Headquarters and Field Offices have also developed complex-wide and site-specific guidance documents and reports that address long-term stewardship issues. These include the *Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfers*, the DOE RCRA/CERCLA Information Bulletin *Planning and Implementing RCRA/CERCLA Closure and Post-Closure Care when Wastes Remain Onsite*, and *Facility Disposition Lessons Learned from the Mound Site Monograph*, prepared by the DOE Office of Environmental Policy and Assistance. DOE also reviewed other Environmental and Property Management Information Bulletins, DOE Site Profiles, Guidance Documents, and information developed by the DOE Stewardship Working Group to identify the specific issues to be included in the *Draft Study*.

DOE considered recommendations related to long-term stewardship developed by advisory groups, stakeholder organizations, and non-DOE entities, including the EMAB, STGWG, the Oak Ridge Stewardship Working Group, the Environmental Law Institute, the Energy Communities Alliance, and Resources for the Future. These include the recommendations in the STGWG report *Closure for the Seventh Generation*, the EMAB *Report and Recommendations on Long-Term Stewardship*, and the *Oak Ridge Reservation Stakeholder Report on Stewardship*. Scoping comments specifically requested that DOE consider the recommendations in these stakeholder reports in developing the scope of the *Draft Study*.

DOE obtained site-specific and program-wide information from other federal agencies with long-term stewardship responsibilities. These include the Department of Defense Base Realignment and Closure (BRAC) program, the Bureau of Land Management, and the Bureau of Reclamation. DOE also reviewed EPA guidance documents concerning long-term stewardship, including guidance on the use of institutional controls as part of CERCLA remedies.

Exhibit B-1. Presentations by the Office of Long Term Stewardship

Date	Organization	Location
November 16, 1999	National Association of Attorney's General	Oak Ridge, TN
November 17, 1999	Idaho National Engineering and Environmental Laboratory Citizens Advisory Board	Idaho Falls, ID
December 8, 1999	Environmental Management Advisory Board	Washington, DC
December 14, 1999	Environmental Management Advisory Board	Washington, DC
January 4, 2000	Nevada Test Site Citizens Advisory Board	Las Vegas, NV
January 5, 2000	Community Advisory Board for Nevada Test Site – Site Programs	Las Vegas, NV
January 15, 2000	Fernald Citizens Advisory Board	Harrison, OH
January 19, 2000	LLRW Decisionmakers' Forum & Technical Symposium	Amelia Island, FL
January 25, 2000	Savannah River Site Citizens Advisory Board	Aiken, SC
February 2, 2000	Office of Science and Technology Focus Area Meeting	Germantown, MD
February 28, 2000	Long-Term Stewardship Workshop Waste Management 2000 Symposium	Tucson, AZ
March 9, 2000	Energy Communities Alliance	Washington, DC
April 7, 2000	Interstate Technology Regulatory Coordination Group	Arlington, VA
April 18, 2000	Applied Research, Development & Deployment Cleanup Technology Colloquium	Scottsdale, AZ
May 24, 2000	Environmental Quality Portfolio Analysis	Televideo Conference

Exhibit B-2. Scoping Comments

Commenter, Date Received, Summary of Scoping Comments, Where Addressed in *Draft Study*
1. State Attorney General Office, January 4, 2000 • Suggests that DOE evaluate the failure of institutional controls and then recommend methods to prevent/minimize such failures in the future. (Chapter 5) • Asks DOE how it intends to provide long-term protection for UMTRCA "vicinity properties" in cases where owners did not allow property cleanup. (out of scope) • Proposes that DOE dedicate part of each former DOE facility as a historic site or museum for long-term information management. (Out of scope) • Requests that DOE respond to the STGWG recommendations in "Closure for the Seventh Generation." (STGWG comments included in boxes entitled "Applicable Scoping Comments and Issues" in Chapters 2-10) • Asks DOE to describe funding approaches available for long-term assurance of adequate oversight without relying on Congressional appropriations. (Chapter 2, Chapter 8) • Recommends that DOE evaluate the pros and cons of different federal agencies performing long-term stewardship responsibilities, esp. at sites with significant natural resources/historic preservation values. (Chapter 4) • Suggests that DOE consider the issue of cost of stewardship activities when taking a remedial action that may have long-term stewardship implications and provide for redundant/overlapping oversight mechanisms to ensure that such long-term stewardship/remedial action decisions are appropriately carried out. (Chapter 3)
2. Private citizen, January 4, 2000 • Suggests that each major site have its own detailed long-term stewardship plan that must be approved/reviewed by EPA and the State. (Chapter 4) • Recommends that the Study include discussion on the approaches to long-term stewardship and land use control used by other federal agencies and other nations. (Chapter 4, Chapter 6) • Study should assess the relative roles of active vs. passive controls with guidance on determining the length of time for active controls. (Chapter 5) • Study should discuss approaches for preserving information about a site and its past activities and contamination history. (Chapter 2, Chapter 7)
3. Private citizen, January 4, 2000 Provides alternative definitions of long-term stewardship. (Chapter 1) • Asks DOE to assess several natural resources damage and cleanup issues/decisions. (Chapter 9) • Recommends that the Study be conducted by those not previously involved with DOE, DOD, and National Labs because of possible bias, and asks that stakeholders and Tribes be involved fully in the Study. (out of scope) • Wants DOE to focus more on protecting the future and actual cleanup of sites rather than assessing the need for cleanup. (Chapter 2) • Asks that stewardship involve leaving a site in a better natural condition than when DOE started using the site. (out of scope)

Commenter, Date Received, Summary of Scoping Comments, Where Addressed in *Draft Study*
4. Private citizen, January 4, 2000 • Wants DOE to create a single headquarters office with cross-cutting authority to oversee long-term stewardship activities and develop rules and approve individual site plans. (Chapter 4) • Recommends that long-term stewardship decisions be transparent by involving the public and that public involvement be a key element in the planning and implementation of stewardship programs. (Chapter 2, Chapter 9) • Suggests that DOE use life-cycle accounting to assess the complete costs, present and future, associated with cleanup decisions. (Chapter 8) • Asks DOE to seek alternative funding for long-term stewardship in the form of trust funds or endowments, fee-generating scheme etc. since Congressional appropriations are uncertain. (Chapter 8) • Emphasizes that DOE needs to institute a reliable documentation update/revision system to ensure that crucial data on each site is preserved. (Chapter 7) • Acknowledges that DOE may not remain the steward and asks that provisions be made for another entity to take over as steward. (Chapter 4, Chapter 10) • Believes that DOE should evaluate the reliability of institutional controls; DOE should adopt redundant/overlapping functions to ensure efficacy of control measures; and every long-term stewardship plan should have an emergency response component to address failure of such controls. (Chapter 5) • long-term stewardship plans should be flexible and take into account future advances in technology, science, changes in cultural values and politics etc. and undergo revision via a democratic process. (Chapter 10) • Proposes that DOE continue R&D activities to minimize residual contamination and reduce future long-term stewardship costs. (Chapter 4)
5. Citizen group, January 4, 2000 No relevant suggestions for national study. Requested EM briefing at Spokane Indian Reservation and/or Spokane. Requested copy of *Background Document*
6. State regulatory agency, December 15, 1999 • Wants DOE to explain why residual contamination will remain at some sites. (out of scope) • Suggests that the Study examine alternative internal organizational/program strategies and financial mechanisms that will be needed to maintain long-term stewardship programs. (Chapter 8, Chapter 10) • Would like Study to examine DOE's existing legislative authorities for maintaining long-term institutional control over contaminated sites and the alternatives for sharing regulatory responsibilities with other federal agencies. (Chapter 3, Chapter 4)
7. State regulatory agency, January 4, 2000 • Requests a more uniform definition of long-term surveillance and maintenance. (Chapter 5) • Recommends that the Study address the need for consistent policy and guidance at the Secretary of Energy level for long-term stewardship across all departmental programs. (Chapter 4) • Asks that the Study discuss contingency/emergency plans being included in long-term stewardship plans. (Chapter 5) • The state expects to work with DOE on the NDAA Report and wants the Study to be consistent with the NDAA Report to Congress. (Chapter 1) • Emphasizes that the Study must identify milestones for activities leading to a final action or decision by DOE on its plan for long-term stewardship. (Chapter 4)

Commenter, Date Received, Summary of Scoping Comments, Where Addressed in *Draft Study*
8. DOE Advisory Group, January 4, 2000 • Addresses DOE's responses (5-24-99) to earlier recommendations. (out of scope) • Emphasizes that DOE retains liability in perpetuity for all contamination at its sites. (Chapter 6) • Expresses concern over DOE's reliance/dependency on the use of institutional controls for extended periods. (Chapter 5) • Asks DOE how it intends to assess comprehensively all elements in determining cleanup levels and future land uses. (Chapter 3)
9. Citizen group, January 6, 2000 No scoping comments provided. General comments are provided urging DOE to completely decommission facilities that are no longer needed. Supports projects like the AMWTF at INEEL.
10. State regulatory agency, January 10, 2000 • Wants DOE to establish consistent policy and guidance for stewardship across all DOE programs. (Chapter 4) • Also wants DOE to ensure programmatic effectiveness of long-term institutional controls and mechanisms for restricting future land use. (Chapter 5, Chapter 6)
11. Environmental group, January 12, 2000 No scoping comments provided. Requests DOE to extend the scoping period for 30 days, or until February 3, 2000.
12. Citizen Advisory Group, January 12, 2000 • Requests DOE to address the issues raised in the two-volume document, "The Oak Ridge Reservation Stakeholder Report on Stewardship" and the comments submitted by [see number 7 above].
13. State regulatory agency, January 26, 2000 • States that the state is directly affected by decisions concerning the cleanup of the Hanford site. (out of scope) • Is disappointed at the lack of public involvement in developing the study – only two public meetings, both of which were held on the eastern half of U.S. (Chapter 1, Appendix B) • Concerned that stewardship will substitute actual cleanup – does not agree that leaving contamination in place under long-term stewardship is a primary cleanup strategy. Long-term stewardship should be instituted only *after* the necessary cleanup action to remove maximum amount of contamination has been undertaken. (Chapter 3) • Skeptical of the viability of long-term institutional controls citing the historical evidence of transient nature of institutions and commitments. (Chapter 5)
14. Environmental group, January 31, 2000 • Concerned that long-term stewardship will be used an excuse to avoid cleanup of sites. (Chapter 3, Chapter 10) • Wants more emphasis on groundwater monitoring. (Chapter 5) • Suggests conducting health studies alongside monitoring of waste and caps etc. (Chapter 4) • Questions who will be overseeing, esp. in multi-program site cases – does not trust DP to conduct long-term stewardship effectively. (Chapter 4, Chapter 6)

Commenter, Date Received, Summary of Scoping Comments, Where Addressed in *Draft Study*
15. Private company, February 2, 2000 • Advises that DOE-EM's long-term stewardship obligations be fully addressed in conjunction with all new DOE projects and missions. (Chapter 6) • States that DOE should consider the use of commercial facilities to manage its waste instead of using on-site DOE facilities. Further adds that DOE should have addressed this option in its WMPEIS. (out of scope) • Emphasizes that an institutional bias at DOE favors the development of new "on-site" DOE projects by traditional DOE contractors since this allows DOE to maintain and/or increase its current scope of work/mission. (out of scope) • Believes that on-site waste treatment and disposal facilities increase DOE's long-term stewardship obligations. Believes that DOE's use of "off-site" commercial options for waste treatment and disposal as opposed to DOE's development of new "on-site" treatment and disposal facilities can reduce DOE's long-term stewardship obligations. (out of scope)
16. Citizen Advisory Board, February 27, 2000 • Acknowledges that comments were submitted late but would still like them to be included/addressed in the study. • Considers the scoping process to be limited since scoping meeting was held in Oak Ridge, TN and not conducted on a regional basis to allow residents near sites to participate. (Chapter 1, Appendix B) • Recommends that study carefully review, document, and provide recommendations on the transfer of liability for monitoring, surveillance, and cleanup for properties that are sold into the private sector or to other governmental entities. (Chapter 6) • Also suggests that study explicitly show how liability will be assigned in the event of the failure of a subsequent landholder to perform adequately (e.g., bankruptcy) so that public is guaranteed that a responsible steward is always identifiable. (Chapter 6) • Emphasizes that the study should identify process(es) whereby owners and neighbors are made aware of, in perpetuity, the nature and extent of contamination and use restrictions and maintain corporate memory so that any attrition of personnel and changes in filing and computer systems do not result in loss of corporate memory. (Chapter 7) • Suggests that study provide that stewardship activities of DOE contractors be mandated by law. (Chapter 4) • Study should explore the option of setting up funding for stewardship separately from other operational and programmatic funding for the contractors, and supported by a source not subject to the annual appropriations process. (Chapter 8)
17. State regulatory agency, March 24, 2000 • Discusses an underground nuclear test area (UGTA) as an unique DOE former nuclear test site in the continental U.S. because of the uncontrolled pathways allowing radionuclides from the underground tests to enter the accessible marine environment. (out of scope) • Comments focus on approaches that should prove helpful to DOE in carrying out its long-term stewardship responsibilities at such a site. (out of scope) • Scope of contamination at DOE's UGTA sites should discuss the contaminated subsurface areas and marine waters around the site as media of special concern. (out of scope) • Questions how DOE and its affiliates in the nuclear testing program will meet their joint long-term stewardship responsibility at the site and which federal entity will be assigned long-term stewardship responsibility -- DOD, DOE, USFWS? (out of scope) • States that past monitoring efforts for the region have been poor and deficient and suggests several types of monitoring plans that need to be included in a long-term stewardship plan. States that this is critical for building stakeholder trust and confidence from the native population in the region that depends on subsistence survival from the natural environment, e.g., fishing. (Chapter 9) • Suggests forming a joint long-term stewardship assessment group involving State, Tribal Governments, and other stakeholders to independently conduct long-term monitoring under a "trust" funding mechanism. (Chapter 8)

Commenter, Date Received, Summary of Scoping Comments, Where Addressed in *Draft Study*
18. State regulatory agency, October 28, 1999 • DOE needs to provide adequate information to the public. (Chapter 7) • States that the boundaries of most sites include very contaminated areas and some clean areas; he states that these should be accounted for separately. (Chapter 6) • States that DOE needs to recognize what areas need to be cleaned up, what has been cleaned up and is now in a long-term stewardship state. (Chapter 6) • States that DOE needs to identify what is expected to be cleaned up to pristine standards for unrestricted use, and what can never be cleaned up completely with available technologies; identifying sites in this way will help DOE build a reliable program, identify research needs, and budget appropriately. (Chapter 3) • Suggests that long-term stewardship will inevitably fail; it's only a matter of when and where it will fail. Suggests that efforts can delay it or stretch it out, but not prevent failure. Recommends that DOE assume that long-term stewardship will fail, and the report should consider this possibility. (Chapter 5) • Suggests that currently, long-term stewardship relies on several things going perfectly: perpetual funding, perpetual record-keeping, perfect monitoring and modeling, and effective containment. DOE should consider the consequences if these don't remain perfect, specifically with regard to health impacts, ecological impacts, economic disruption, and disproportionate effects of future exposures on certain segments of the population (manual laborers, low-income communities, etc.). (Chapter 5) • When starting new projects, DOE should be required to provide a technical plan and adequate funding to fully clean up any waste or contamination that would result from the project. (Chapter 6)

Commenter, Date Received, Summary of Scoping Comments, Where Addressed in *Draft Study*

State and Tribal Working Group (STGWG), *Closure for the Seventh Generation*, February 1999

Commenter number 1 requested that DOE respond to recommendations in the report "Closure for the Seventh Generation." The STGWG recommendations from that report are summarized here.

Goals of Long-term Stewardship

- Any accepted long-term institutional control or stewardship program must ensure long-term protection of human health, the environment and cultural resources. (Chapter 9)

Long-term Stewardship Planning.

- The specifics concerning the goals of institutional controls, the types of controls required, the manner in which the controls will be implemented, and how the controls will be maintained should be evaluated for each alternative being considered in a feasibility study. (Chapter 3)
- DOE should more fully explain and quantify the required long-term cost and funding commitment required for long-term institutional controls; should develop plans to ensure the availability of adequate funding for these controls; and should not consider decisions requiring these controls to be final until DOE can implement an acceptable stewardship program that includes an acceptable funding mechanism. (Chapter 8)
- DOE should develop methods for accurately reflecting long-term institutional controls, monitoring, or maintenance commitments in decision documents or should identify any uncertainties related to these commitments. (Chapter 3)
- DOE should establish mechanisms for the collection, retrieval, and storage of information needed for long-term stewardship and site historic preservation programs. (Chapter 7)
- DOE should continue to work with regulators and stakeholders to develop an acceptable stewardship program. Each site should develop a stewardship plan that defines constraints, costs, and implementation mechanisms. (Chapter 4)
- Stewardship planning and implementation should be an iterative process. DOE sites and headquarters should re-evaluate and revise stewardship plans and implementation on a routine basis to reflect decisions made and changing conditions. (Chapter 10)

Long-term Stewardship Implementation

- DOE should create a specific program office, not limited to the EM program, to manage stewardship responsibilities. (Chapter 4)
- DOE should retain ownership and control of lands for which institutional controls are necessary unless adequate legal mechanisms and institutions exist to enforce such controls against future landowners. (Chapter 6)
- Experience shows that implementing legislation facilitates maintaining long-term commitment of resources. DOE should continue to work with the states, tribes, and other stakeholders to explore the parameters of statutory long-term stewardship. (Chapter 4)
- For new construction and new facilities, the closure and long-term commitments associated with the facility should be addressed in the initial approval decision. Provisions should be made for closure and post-closure funding for the facility. (Chapter 6).

Public Education and Awareness

- DOE needs to complete the final report, *Moving from Cleanup to Stewardship*, and distribute it for public comment as soon as possible. (out of scope)

Exhibit B-3. The 27 Issues Noted During the Scoping Process

Issue	Where Addressed in *Draft Study*
1. *Relationship of "Cleanup" Decision Process to Long-term Stewardship Needs* - how to better integrate consideration of long-term stewardship needs and requirements in waste management, facility decommissioning, and remedial action decision-making processes?	Chapter 3
2. *Development of Site-specific Long-term Stewardship Plans* - when are they needed; what should they include; how to coordinate development among sites; how to revise and update them?	Chapter 5
3. *Funding Mechanisms* - how much funding will be required; financial obligations of federal, state, and local governments; what will and will not be paid for; when are payments made and funds obligated; adequacy of the annual appropriation model for long-term stewardship?	Chapter 8
4. *Regulatory Drivers, Negotiated Agreements, and Legislative Barrier* - to what extent do existing regulatory requirements address long-term stewardship needs and requirements (are additional regulations needed?); how to better integrate consideration of long-term stewardship issues in planning processes (e.g., NEPA documents)?	Chapter 4
5. *Information Management* - what information will be required; how will it be preserved and made accessible; how should information be provided to federal, state, and local officials and to the general public; what entities will be responsible for information management?	Chapter 7
6. *Relationship of Facility Development Planning to Long-term Stewardship Needs* - how to better integrate consideration of long-term stewardship needs and implications in decisions to site, build, and operate a new facility?	Chapter 6
7. *Science and Technology Development* - how to ensure periodic re-examination of existing end states and long-term stewardship activities to apply new science and technology; how to focus science and technology development on long-term stewardship needs?	Chapter 4
8. *Institutional Controls* - appropriate entities (organizations, individuals) to ensure that long-term stewardship occurs; role of state and local governments at federal sites; long-term viability of existing institutional control mechanisms; variability among state and local laws and authorities?	Chapter 5
9. *Purpose of Long-term Stewardship* - maintaining status quo or reassess site condition and remedy?	Chapter 10
10. *Property Transfer Policies and Procedures* - what obligations and restrictions will convey to future site owners and tenants; what are the mechanisms by which property transfers from federal to non-federal (public or private) entities; role of the federal government after property transfers; variability among state and local property laws; criteria for deciding which property can be transferred?	Chapter 6
11. *Land Use/Natural Resources* - how to integrate on-site and off-site land use planning; how to balance preservation of site assets (e.g., natural or cultural resources, infrastructure) with long-term stewardship needs; how to meet treaty obligations with Tribal governments during cleanup and long-term stewardship?	Chapter 9
12. *Risk Management* - relationship between short-term risk reduction achieved by remedial actions vs. long-term risks during stewardship; potential conflicts between economic benefits of site redevelopment and risks to onsite workers/visitors; how to evaluate and manage risks over multiple generations?	Chapter 5

Issue	Where Addressed in *Draft Study*
13. *Intergenerational Transfer* - what mechanisms and institutions are appropriate means to ensure transfer of long-term stewardship information and responsibility to future generations?	Chapter 10
14. *Stewardship Responsibilities at Non-EM Facilities with Continuing Operations and Multi-Purpose Sites* - what are the options for long-term stewardship responsibilities and funding at non-EM facilities and multi-purpose sites? How do we do long-term stewardship for these sites/facilities? How do you tie long-term stewardship into on-going production sites/facilities?	Chapter 4
15. *If the Department of Energy Goes Away* - what about long-term stewardship if DOE does not exist? What happens? What happens when the Administration changes?	Chapter 10
16. *Sociological/Political Issues* - what is the federal obligation/compensation for impacts related to long-term stewardship? Socioeconomic/local and regional impacts?	Chapter 9
17. *Environmental Justice* - the tribes need to be engaged and involved.	Chapter 9
18. *Realistic Cleanup Standards*	out of scope
19. *Public Involvement* - during and after long-term stewardship.	Chapter 9
20. *Roles and Responsibilities* - who will be responsible in the long term. How can we maintain sustainable responsibility?	Chapter 4, Chapter 10
21. *Enforcement* - who is going to enforce long-term stewardship? Look at the NRC licensing process.	Chapter 4, Chapter 6
22. *Long-term vs. Short-term* - need to articulate what is short vs. long-term and how long is long.	Chapter 10
23. *Tie National Policy to Stewardship Legislative Mandate* - need policy and legislative mandate now. Need these regulatory drivers to get and maintain funding.	Chapter 4
24. *Moral Responsibility to Follow the Waste* - especially when it goes offsite.	out of scope
25. *Minimize Risks/Hazards and Plan for Failures* - need to plan for contingency actions now.	Chapter 5
26. *Expedite* - DOE needs to act now.	Chapter 2, Chapter 4
27. *Social/Citizen Control* - Communities/citizens need to have the information, etc.	Chapter 7, Chapter 9

Appendix C Long-term Stewardship Activities, Guidance, Reports, and Internet Web Sites

DOE is conducting ongoing long-term stewardship activities at DOE headquarters, field offices, and sites. This Appendix highlights DOE's recent long-term stewardship efforts, reports, and activities; describes DOE's long-term stewardship Internet Web Pages; and identifies the points of contact at each DOE field office.

Program Management

- The Assistant Secretary for Environmental Management established the Office of Long Term Stewardship in 1999.

- In 1998, DOE Formed the Long-term Stewardship Working Group to identify and address stewardship issues.

- DOE sponsored three workshops and a background report by Resources for the Future on long-term stewardship and analysis of long-term funding mechanism options.

- DOE sponsored case studies and workshops conducted by the Environmental Law Institute and the Energy Communities Alliance.

- DOE supported local government and SSAB evaluations of long-term stewardship issues at DOE sites (e.g., Rocky Flats Environmental Technology Site, Oak Ridge).

- DOE sponsored contractor reports on data management for long-term stewardship and risk-based requirements for long-term stewardship.

- DOE sponsored an analysis of long-term stewardship risks in the context of other risks by the Consortium for Risk Evaluation with Stakeholder Participation.

- DOE incorporated a Project Baseline Summary (PBS) within the Integrated Planning, Accountability, and Budgeting System – Information System (IPABS-IS) and developed guidance for completing the PBS. Independent PBSs for long-term stewardship are required of all EM sites by Fiscal Year 2003.

- DOE sponsored Environmental Law Institute case studies on institutional controls at the DOE Grand Junction, Mound, and Hanford sites.

- DOE prepared two reports to Congress on land-use planning at DOE sites.

- DOE prepared studies that identified actions for improving how information is currently controlled and maintained in order to provide for long-term stewardship. Relevant studies include *Roadmap to the Year 2000*, and *Responsible Openness: An Imperative for the Department of Energy*.

- The Ohio Field Office has issued guiding principles for long-term stewardship: *Guiding Principles for Long-term Stewardship*. U.S. Department of Energy, Ohio Field Office, Miamisburg, OH, March 27, 2000.

- DOE issued Order 435.1, Radioactive Waste Management. The Order requires DOE sites to develop a performance assessment (PA) and composite analysis (CA) for each low-level waste disposal facility.

- The National Energy Technology Laboratory is currently leading efforts to develop separate cost estimating techniques for long-term stewardship and incorporate these modules into the Environmental Cost Element Structure, a cross-agency framework for estimating and managing environmental management costs.

- In 1999, the Rocky Flats Environmental Technology Site developed an activity-based methodology to estimate their annual stewardship costs based on the type, cost, and duration of anticipated long-term stewardship activities.

Guidance

- *Guidance for Implementation of Long-Term Surveillance and Maintenance at DOE Sites in Long-Term Stewardship*. U.S. Department of Energy, Grand Junction Office, Grand Junction, Colorado, December 30, 1999.

- *Development of Remediation Goals under CERCLA*, DOE, Office of Environmental Policy and Assistance, CERCLA Information Brief. DOE/EH-413/9711, August 1997.

- *RCRA Closure and Post-Closure Plans*, DOE, Office of Environmental Guidance, RCRA Information Brief. DOE/EH-231-009/1291, December 1991.

- *Planning and Implementing RCRA/CERCLA Closure and Post-Closure Care When Wastes Remain Onsite*, U.S. DOE, Office of Environmental Policy and Assistance, RCRA/CERCLA Information Brief. DOE/EH-413-9910, October 1999.

- *Using Remedy Monitoring Plans to Ensure Remedy Effectiveness and Appropriate Modifications*, U.S. Department of Energy, Office of Environmental Policy and Assistance, RCRA/CERCLA Information Brief. DOE/EH-413/9809, July 1998.

- *Effects of Future Land Use Assumptions on Environmental Restoration Decision Making.* U.S. Department of Energy, Office of Environmental Policy and Analysis, RCRA/CERCLA Information Brief. DOE/EH-413/9810, July 1998.

- *Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfers*, U.S. Department of Energy, Office of Environmental Policy and Assistance. DOE/EH-413/97/2, October 1997.

- *CERCLA Requirements Associated with Real Property Transfers.* U.S. Department of Energy, Office of Environmental Policy and Analysis, CERCLA Information Brief. EH-413-9808, April 1998.

Reports

- *From Cleanup to Stewardship*. U.S. Department of Energy, Office of Long Term Stewardship, October 1999. DOE/EM-0466.

- *1999 Long-Term Surveillance and Maintenance Program* Report, U.S. Department of Energy, Grand Junction Office, Grand Junction, Colorado, April 2000.

Long-term Stewardship Internet Web Sites

http://lts.apps.em.doe.gov/

This website is a tool of the DOE Long-Term Stewardship Working Group for providing long-term stewardship information to the public. The website provides news and information concerning DOE's long-term stewardship activities, including the long-term stewardship study, NDAA Report to Congress, other complex-wide and site-specific reports and workshops, and site-specific perspectives on long-term stewardship.

http://www.em.doe.gov/settlement/index.html

This website provides news and information about the implementation of the December 12, 1998 Programmatic Environmental Impact Statement Settlement Agreement, and provides links to the Central Internet Database, Citizen's Monitoring and Technical Assistance Fund, and Long-term Stewardship Study Internet Web Sites.

http://www.em.doe.gov/settlement/index2.html

This website provides access to the Central Internet Database (CID). The CID contains reports for radioactive waste, contaminated media, spent nuclear fuel, non-radioactive waste, toxic waste, facilities, and materials in inventory. CID also contains information on DOE's current and projected waste and spent nuclear fuel inventories, management activities, and shipping and receiving quantities. The CID has organized much of its information in a searchable manner, according to state, site, DOE programs, or year.

http://www.em.doe.gov/settlement/funding.html

The Settlement Agreement requires that DOE establish a $6.25 million citizen monitoring and technical assistance fund. This Internet Web Page provides information concerning the purpose and administration of the fund.

http://doe-web-rpt.em.doe.gov/login.asp

This website provides access to site-specific “Paths to Closure” data.

http://www.lastinglegacy.net/legacy3.1/loadup.htm

This interactive website explains production, waste, and stewardship across the nuclear weapons complex over time.

http://ndaa.longtermstewardship.net/ndaa/index.asp

This website provides access to site-specific long-term stewardship data for the NDAA *Report to Congress.*

Appendix D Statutory, Regulatory, and Executive Order Requirements and Obligations for Long-Term Stewardship

DOE is required to conduct long-term stewardship activities in accordance with various statutes, regulations, Executive Orders, and International and Tribal government treaties. These statutes, regulations, Orders, and treaties vary considerably in site-specificity, detail, and purpose. Statutes that broadly require DOE to conduct long-term stewardship activities include the Atomic Energy Act (AEA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also known as Superfund) and the Resource Conservation and Recovery Act (RCRA). The AEA requires DOE to conduct its activities in a manner that protects human health and the environment. RCRA and CERCLA, as implemented through the Federal Facilities Compliance Act, broadly require DOE to ensure that contaminated sites and associated residual hazards are managed to protect human health and the environment over the long-term. Specific activities that DOE must conduct in order to manage residual hazards at DOE sites are established in RCRA and CERCLA regulations and through site-specific agreements with the regulators.

Statutes that require DOE to conduct long-term stewardship activities at specific sites include the WIPP Land Withdrawal Act (LWA), the Nuclear Waste Policy Act, and the Uranium Mill Tailings Radiation Control Act (UMTRCA). These statutes do not apply to the entire DOE complex, only to specific sites and facilities. The WIPP LWA is applicable to the Waste Isolation Pilot Plant; the Nuclear Waste Policy Act is applicable to high-level waste disposal facilities; and UMTRCA is applicable to former uranium and thorium milling sites. These Acts and their associated regulations require DOE to implement specific engineered and institutional controls for these sites in order to ensure effective long-term stewardship.

Other requirements for long-term stewardship activities that apply to DOE are related to DOE's status as a federal agency and the Department's role as an owner and manager of federal lands.

- The National Environmental Policy Act (NEPA) requires agencies to conduct environmental impact analyses of major federal actions that may significantly affect the quality of the human environment, including assessment of impacts to natural and cultural resources.

- DOE Order 1230.2, American Indian Tribal Government Policy, requires that obligations under the Federal Indian Trust Responsibility (Seminole Nation v. United States, 1942) and treaty obligations should be met.[1] Treaty obligations require a long-term planning process, which directly affects Tribal rights as they were defined when treaties were signed.

[1]Tribal governments have a special and unique legal and political relationship with the US Government, defined by history, treaties, statutes, court decisions, and the US Constitution. The United States has entered into more than 600 treaties and agreements with American Indian Tribes. These treaties and agreements create a variety of legal responsibilities by the United States toward Tribes and provide the basis for a government-to-government relationship. Although the Department of the Interior, through the Bureau of Indian Affairs, has the principal responsibility for upholding obligations of the federal government to American Indians, this responsibility extends to all federal agencies, including DOE. *Source*: DOE Order 1230.2 *American Indian Tribal Government Policy*, April 8, 1992, available at *http://www.explorer.doe.gov:1776*.

- Federal real property management statutes establish requirements for owners and managers of federal land, including the acquisition, transfer, management, and sale of public land.

- The Endangered Species Act, the National Historic Preservation Act, the Archeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, and other statutes require federal agencies to manage natural resources and cultural resources.

- Federal agencies including DOE are subject to Executive Orders issued by the President that may include provisions for long-term stewardship activities for public lands, such as wetlands or fisheries.

Exhibit D-1 lists major statutes, regulations, and Executive Orders that may affect long-term stewardship activities.

***** NOTE *****

Exhibit D-1 is intended as an information resource for DOE managers and others to identify long-term stewardship requirements for the Department. The Exhibit will contain a summary of long-term stewardship requirements and is currently being reviewed by the DOE Office of Environment, Safety, and Health and the DOE Office of General Counsel. The Exhibit will be included in the Final Long-term Stewardship Study.

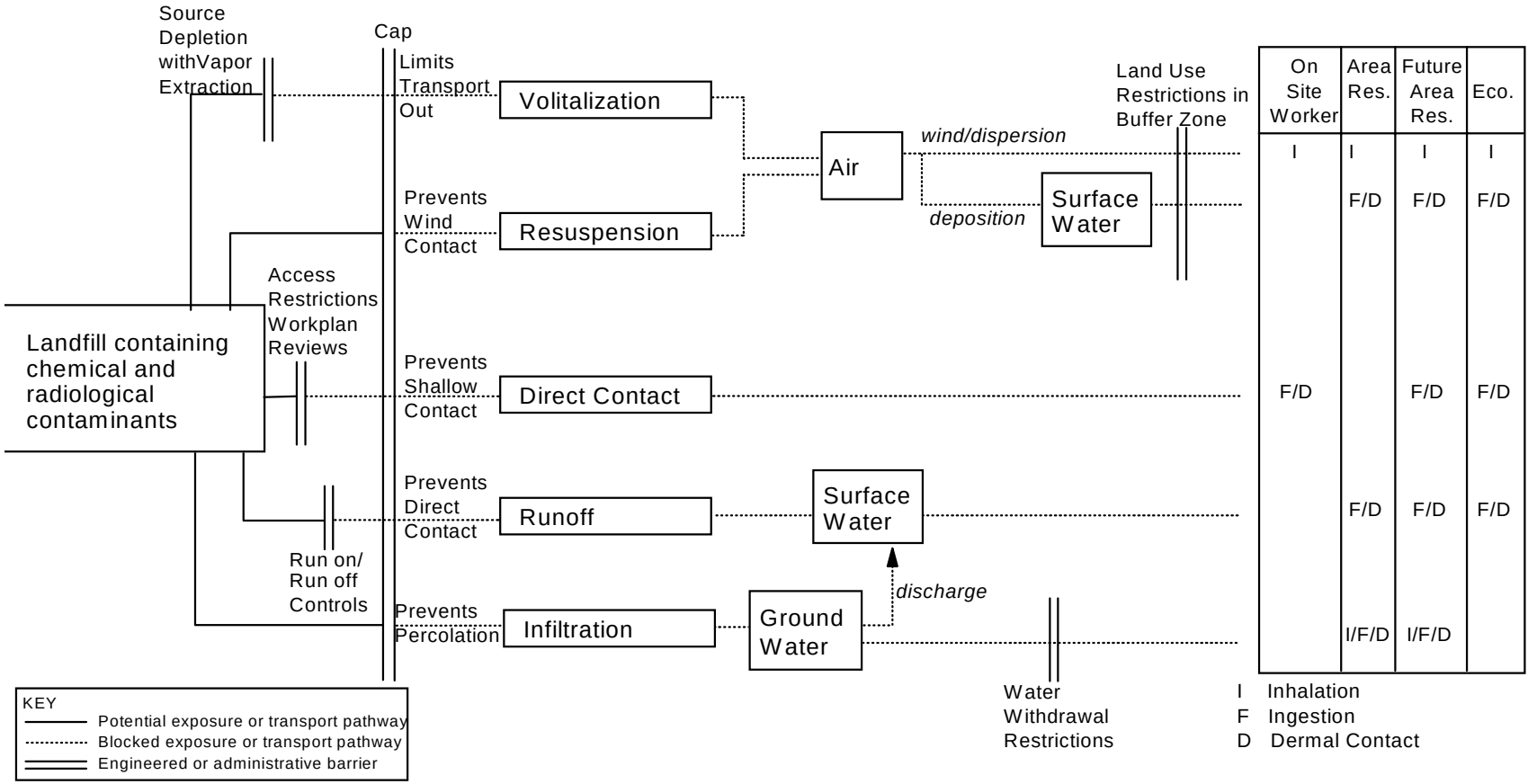
Appendix E Using a Conceptual Site Model to Communicate End State

Conceptual Site Models (CSMs) are used during cleanup actions to depict the relationship between existing hazards, environmental transport mechanisms, exposure pathways, and ultimate human and ecological receptors. CSMs can also be used to distinguish between known and unknown site conditions (e.g., the existence of fractured bedrock or preferential pathways for groundwater flow). While CSMs have traditionally been used for individual Operable Units or Areas of Concern, it may be possible to develop a long-term stewardship CSM for broader areas of a site (encompassing multiple Operable Units or Areas of Concern). A long-term stewardship CSM, however, may be difficult to develop or impractical at large, complex sites. Functional equivalents could include management plans specific to particular biological resources, or area management plans.

Long-term stewardship CSMs could be used to illustrate the characteristics of a site and its residual hazards, how hazards have been contained, how exposure pathways have been blocked, and the uncertainties that may affect the performance of engineered and institutional controls. Where significant uncertainties exist, the CSM could identify the range of scenarios that are probable or otherwise indicate the importance of the uncertainties. The resulting model could serve as the basis for evaluating the likelihood and consequences of events such as barrier failures, identifying how stewards can plan to mitigate these events, and predicting the ability of future generations to ensure protectiveness based on improved technology and increased understanding of science. The CSM also could serve as a tool for communicating with local governments and stakeholders. An example of a long-term stewardship conceptual site model is presented below.[1]

[1] *Planning and Implementing RCRA/CERCLA Closure and Post Closure Care when Wastes Remain Onsite*. U.S. Deparment of Energy, Office of Environmental Policy and Assistance, RCRA/CERCLA Information Bulletin, DOE/EH-413-9910, October 1999.

Exhibit 2. Example of Post-Remediation Conceptual Site Model



Components of End State	Description
Waste Characteristics	One landfill remains on site. Contaminants include: Ra-226, Sr-90, NO, CHCL, DCE, Toluene, H_3, C_{14}, and DCA. The estimated volume of material is 420,000 y_3; a minumum of 1,000 curries was disposed in the landfill, based on historical records and knowledge of past practices.
Unit Characteristics	Landfill is approximately 50 - 60 feet above the upper huydrostratigraphic unit (HSU) and approximately 80 ft. above the lower HSU of the groundwater aquifer. The contaminants detected in the upper HSU include: $CHCl_3$, DCA, Cr, NO_3, DCE, Toluene, H_3, and C_{14}. Contaminants detected in lower HSU include: Cr, NO, CHCl3, DCE, Toluene, H_3, C_{14}, and DCA.
Barriers in Place	One single-layer cap with a design life of 30 years covers the landfill. Vapor extraction system installed and operated until concentrations drop below threshold. Land use restriction covenants in place such that: (1) There can be no digging in the landfill area; and (2) There shall be no agriculture or residential use of groundwater; pumping groundwater from wells is prohibited.
Other Key Assumptions to Maintain Protectiveness	Land use will remain industrial. Monitored natural attenuation will demonstrate that contaminants in the groundwater are below MCLs in 20 years. Remaining contaminants in landfill are will not continue to leach to the groundwater. An alternate water supply is provided to local residents.

Appendix F Developing Uncertainty Matrices to Communicate Uncertain Conditions

One key to successful communication and implementation of long-term stewardship will be to identify and describe to future site stewards the residual hazards and any associated uncertainties that remain once cleanup is complete. It is important for local residents to understand the need to adhere to and maintain land use and access controls imposed on a site because of residual contamination/hazards. Site stewards need to understand the potential for breaks in the barriers to occur, understand the impact on human health and the environment should a failure in the remedy occur, and have prepared a contingency plan for addressing the situation before major problems occur. This information can be organized and characterized with a tool called an "uncertainty management matrix". An example is presented below.

Exhibit F-1. Example Uncertainty Matrix for Long-term Stewardship

Expected Condition	Reasonable Failure	Probability of Occurrence	Time to Respond	Impact	Monitoring Plan	Contingency Plan
Cap prevents infiltration and subsequent leachate development.	Burrowing animals or plant roots will breach cap integrity	High. Operations of other landfills indicate that over time this is a common intrusion scenario.	Short for animals. In the case of plants, it takes time to establish a deep root system.	Significant since cap integrity will be lost and leachate is likely to carry contaminants to the ground water.	Site inspection every 3 months to ensure integrity of cap.	A rock cover could be installed to deter burrowing animals. Since lead times are quite short for this pathway, it may be better to install this barrier at the onset (robust design). Plant removal upon detection should mitigate root intrusion.
Access and institutional controls will prevent excavation through cap.	Humans will dig in the area of the landfill, breaching integrity of the cap.	Low. Additional controls (i.e., land use restrictions and a fence) are in place to prevent human intrusion.	Short for direct contact of humans, longer for loss of cap effectiveness with respect to infiltration.	Same as above. In addition, intrusion into the soil would likely result in dermal contact with radioactive contaminants, posing an unacceptable risk to human health.	Site inspection will include surveillance of cap condition, evaluation of fence integrity and maintenance of land use controls.	Reevaluation of remedy will be conducted if humans breach the integrity of the cap and land use controls are not functional. Options may include more sophisticated fence designs, site security, and armoring.
Contaminants in the groundwater will naturally attenuate to levels below MCLs within a 20-year timeframe.	Contaminants do not attenuate naturally to levels below MCLs within the required timeframe.	Low. Based on modeling of site conditions, contaminant characteristics, and the general trend established by existing monitoring data, MCLs will be attained within a 20-year timeframe.	Long. Monitoring data will indicate if the current trend in contaminant reduction changes. Based on these data, the site manager will have advance warning if end objectives will not be met in 20 years.	1. High. If groundwater remediation goals cannot be reached in the 20-year period, unit regulators will require a different remediation approach, which would be quite costly. 2. Low. No risk to human health would result from additional contamination of the groundwater because land use restrictions and an alternate drinking supply prevent ingestion.	Wells within the plume will be sampled every 3 months to ensure that natural attenuation is reducing the concentration of contaminants in the groundwater. Sentinel wells will be monitored quarterly to detect any escapement near receptor wells.	If data indicate significant negative deviation from predicted trends in plume concentrations, an extraction type of remedy will be installed.

Appendix G DOE Property Transfer Requirements

This Appendix summarizes federal real property transfer requirements, including requirements applicable to federal agencies in general, requirements specific to DOE, and CERCLA property transfer requirements. As background, the appendix first describes the roles of the various agencies potentially having jurisdiction over federal real property owned or controlled by DOE, and also describes the legal authority and implementing regulations that control property transfers. This is followed by a description of the various procedures that DOE may employ to transfer real property. The appendix closes with a description of CERCLA requirements related to disclosure of hazardous substances and the transfer of contaminated property.

Agency Roles, Legal Authority, and Implementing Regulations for Property Transfers

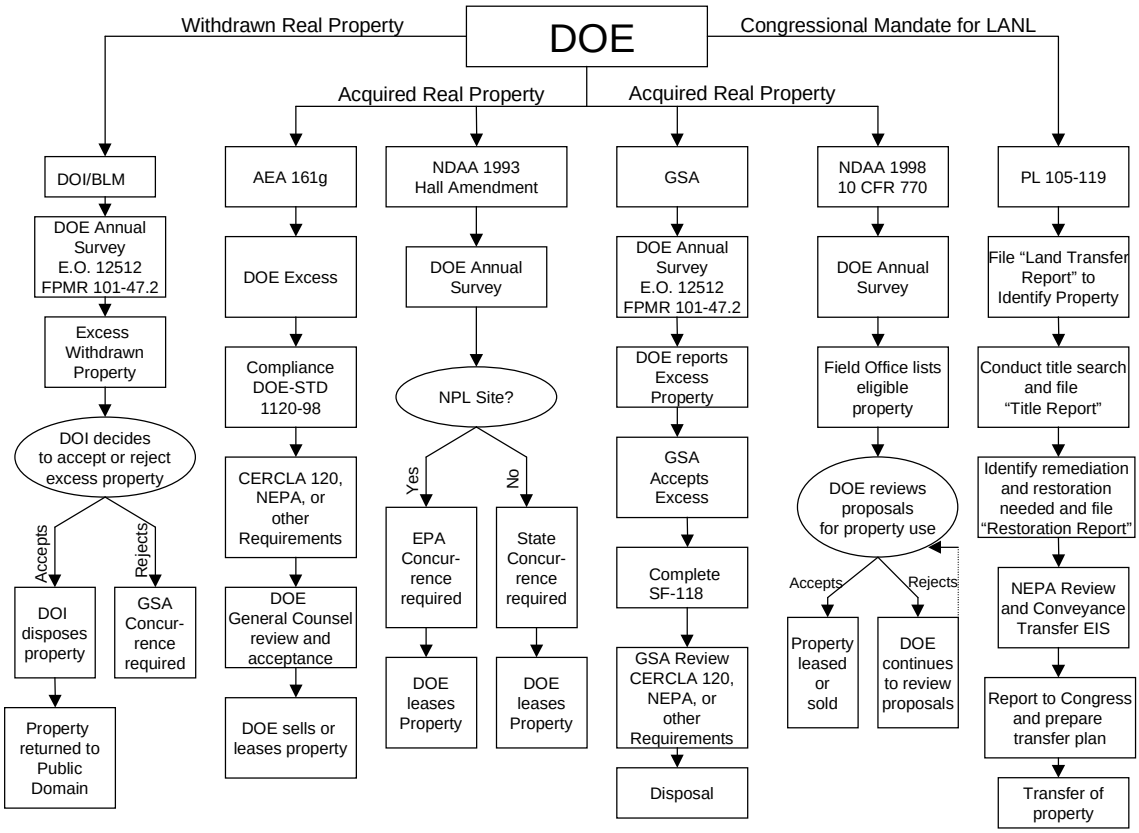
To understand the property transfer requirements, it is important to know that other federal agencies and their associated statutes and regulations often have a role in transfer of property owned or controlled by DOE. Depending on the type of property that DOE is transferring, the Department of Interior's (DOI) Bureau of Land Management (BLM) and the General Services Administration (GSA) may play a role. DOE has authority under the Atomic Energy Act (AEA) to engage directly in real property transfers without BLM or GSA involvement in some circumstances. There are specific statutes that grant DOE such authority, including AEA and the DOE Organization Act[1] (see Exhibit G-1). The type of property transfers that may occur, the required procedures, and the potential recipients of the property will depend, in part, on how DOE first acquired ownership or control of the property: by direct purchase; by withdrawal from the public domain and reservation by DOI for use by DOE; or through some other process such as a grant or gift. In addition, Congress sometimes directs DOE by legislation to transfer certain properties without the involvement of BLM or GSA.

The Environmental Protection Agency (EPA) becomes involved in federal land transfers when sites proposed for transfer have hazardous waste contamination. EPA's authority in these transactions derives from the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Other federal agencies may become involved if the property transfer would impact other resources (e.g., wetlands, endangered species, archaeological or historic resources).

BLM Oversight. BLM has jurisdiction over transfers involving property that was acquired by DOE through withdrawal from the public domain. Withdrawn properties that were reserved by DOI for DOE must be relinquished to the original holder upon completion of DOE missions for which the land was withdrawn. Withdrawn land comprises 62 percent of DOE's real property. GSA may become involved in these property transfers. For real property transfers of withdrawn land, federal agencies are required to transfer the land in accordance with the Federal Land Policy and Management Act of 1976 (Public Law 94-579, as amended). The regulations on the

[1] *Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfers.* U.S. Department of Energy, Office of Environmental Policy and Assistance, October 1997. DOE/EH-413/97/2, October 1997.

Exhibit G-1. Potential Disposition Paths for Excess DOE Real Property



Withdrawn Real Property. DOE transfers all withdrawn real property under the authority of Federal Land Policy and Management Act of 1976 (Public Law 94-579 as amended), with concurrence from the Department of the Interior (DOI). Executive Order 12512 (April 29, 1985) and Federal Property Management Review (FPMR) 101-47.2 require real property utilization surveys at DOE facilities. DOI has the discretion to decide whether the property is suitable for return to the public domain. If the property is contaminated or has any "improvements" upon it, it may be rejected by DOI, and GSA concurrence is required. If DOI accepts the excess property it will return the land to the public domain, often as land under the jurisdiction of the Bureau of Land Management (BLM).

Acquired Real Property – Atomic Energy Act. DOE uses its broad authority to sell or lease acquired real property under Section 161(g) of AEA of 1954. Property disposals under the Act must comply with DOE internal orders including DOE-STD-1120-98, Integration of Environment, Safety and Health into Facility Disposition Activities. It is DOE policy to file a memorandum to the Real Property Branch and to have the Assistant General Counsel for General Law or appropriate Field Counsel review the transfer of real property.

Acquired Real Property – Hall Amendment. DOE uses its broad authority under Section 3154 of the National Defense Authorization Act of 1993 ("Hall Amendment") to lease acquired land to promote the public interest, with special emphasis on economic development. DOE conducts an annual survey to determine excess real property. The determination to lease is made by DOE Field Office Manager. If the property is on the CERCLA National Priorities List (NPL), DOE must obtain concurrence from EPA. If the property is not on the NPL, DOE must obtain concurrence from the appropriate state regulatory agency.

Acquired Real Property – GSA. DOE disposes of acquired real property through the GSA under the Federal Property and Administrative Services Act of 1949. A determination by DOE that the property is "excess" to facility needs is required before disposition may proceed. Standard Form 118, "Report of Excess Real Property" must be filed with the GSA.

Acquired Real Property – NDAA. DOE disposes of real property pursuant to section 3158 of the National Defense Authorization Act of 1998 and 10 CFR Part 770. Field Office managers will provide the Community Reuse Organization and other interested parties with a list of real property that may be transferred under this Act. DOE reviews property use proposals to determine the economic development impact and if the use would be in the best interest of the government.

Congressional Mandate. (example) Public Law 105-119, the Departments of Commerce, Justice, and State, the Judiciary, and Related Agencies Appropriation Act of 1998 requires DOE to convey or transfer certain Los Alamos National Laboratory (LANL) real property to the County of Los Alamos or the Secretary of the Interior, in trust for San Ildefenso Pueblo. In October 1999, DOE issued the Conveyance and Transfer Final Environmental Impact Statement, which was required under PL 105-119. In the associated March 2000 Record of Decision, DOE decided to convey or transfer 10 tracts of land, in whole or in part, subject to DOE's ability to complete needed environmental restoration or remediation.

restoration and revocation of withdrawn land that BLM developed to implement the Act are included in 43 CFR Part 2370.

DOE may temporarily outgrant withdrawn lands to other parties by lease with the consent of BLM. An exception is that withdrawn lands that are under the purview of the Atomic Energy Act and that are temporarily not needed, may be outgranted by DOE without BLM consent (Section 161(g) of the Atomic Energy Act). In a few situations, DOE has been permitted by other federal agencies to build facilities on land withdrawn for use by those other federal agencies. In such cases, DOE may outgrant DOE facilities as long as (1) the terms of the lease are consistent with the original withdrawal and original use permitted by BLM and (2) the other federal agency agrees.[2]

Some of the withdrawn lands reserved for and used by DOE now contain improvements, such as buildings, structures, and other facilities, or have otherwise substantially changed in character. Such withdrawn lands are generally not suitable for return to the public domain for disposition other than leasing and are generally turned over to GSA for disposition, when both BLM and GSA concur.

GSA Oversight. GSA's role in property transfers is that they generally have oversight over all acquired land and withdrawn lands that are not suitable for return to the public domain. Acquired land, defined as real property that DOE (or its predecessors) originally purchased, comprises 27 percent of DOE's real property. Disposition of acquired land and withdrawn lands that are not suitable for return to the public domain is governed by requirements of the Federal Property and Administrative Services Act of 1949. GSA issued Federal Property Management Regulations (FPMR) under 41 CFR Parts 101-47 and 109 to implement the Act. AEA and other statutes provide DOE with limited authority to engage directly in real property transfers without GSA authorization.

The Federal Property and Administrative Services Act authorizes federal agencies to declare real property as "excess, underutilized or temporarily underutilized," and dispose of such property. GSA has disposition oversight for property transfers under the Act. In addition, Executive Order 12512, "Federal Real Property Management," and FPMR regulations under 41 CFR 101-47.202-2, require federal agencies to conduct real property utilization surveys. The FPMR requires agencies to conduct an annual survey and Executive Order 12512 requires agencies to conduct a survey every five years.

DOE Authorities. The primary statutory authorities for DOE property transfers are Section 161(g) of the Atomic Energy Act and Section 646(c) - (f) (known as the "Hall Amendment") and Section 649 of the Department of Energy Organization Act. Section 161(g) of the Atomic Energy Act authorizes DOE to transfer real property that was originally acquired under the authority of the Act, or will be used to further the purposes of the Act, without the involvement of the GSA. Section 649 of the Department of Energy Organization Act applies to leasing of

[2]*Cross-Cut Guidance on Environmental Requirements for DOE Real Property Transfers.* U.S. Department of Energy, Office of Environmental Policy and Assistance, October 1997. DOE/EH-413/97/2, October 1997.

underutilized real property. Section 646(c) - (f) of the Act applies to leasing of specific facilities that DOE will close or reconfigure. A number of other statutes have granted DOE limited authority to transfer real property without BLM or GSA authorization or involvement, or have directed DOE to transfer specific real property. These statutes have often been focused on specific DOE sites.

DOE property transfers are governed by the Life Cycle Asset Management (LCAM,) DOE Order 430.1A, including NEPA review, as appropriate. Requirements for Life-Cycle Asset Management include for DOE real property include:

- Use of a DOE-certified real estate specialist to execute the transfer of real property, including land and improvements (e.g., facilities).

- A DOE decision-making process by which land and facilities that are candidates for transfer are either transferred to other DOE program offices, or are determined excess and therefore available for disposal.

- Completion of a pre-transfer review commensurate with the nature of existing hazards for transfer of any contaminated land or facilities, and participation in the review process of the DOE Office of Environment, Safety, and Health.

- Specific procedures for disposition of contaminated facilities, including characterization of hazards, surveillance and maintenance; assessment of decontamination and decommissioning alternatives, identification of a specific facility end point; and preparation of a final report.

- Compliance in all disposition of physical assets with all applicable federal, state, and local laws, regulations, negotiated agreements, and DOE integrated safety management Orders and Policies.

DOE also recently issued an interim final rule (10 CFR Part 770) to address the transfer by lease or sale of unneeded real property at DOE defense nuclear facilities for the purpose of economic development (65 FR 10685, February 29, 2000). Under the interim final rule, which was required by Section 3158 of the National Defense Authorization Act for Fiscal Year 1998, DOE identifies real property at defense nuclear facilities that is unneeded, and provides this information to a local economic development organization. Interested parties may then approach DOE with a specific proposal concerning lease or sale of identified property for the purpose of economic development.

Under the interim final rule, DOE may indemnify an entity receiving the real property against any claim for injury that results from the release or threatened release of any contaminant as a result of DOE (or predecessor agency) activities at the defense nuclear facility. This indemnification provision is similar to provisions enacted for the Department of Defense Base Realignment and Closure (BRAC) program. The indemnification provisions in Section 3158 are intended to facilitate transfers for economic development, because the possibility of as-yet undiscovered contamination poses uncertainties even at sites that have been remediated in accordance with

applicable regulatory requirements. DOE may grant indemnification when it is deemed essential for facilitating local redevelopment of DOE real property proposed for transfer.

Requirements and Procedures

Internal DOE Screening. One place to begin in illustrating the requirements and procedures for property transfers is DOE's procedures for the identification of excess property. The site manager of a DOE field element (these include operations offices, field offices, energy technology centers, and power marketing administrations) identifies real property that is no longer needed by a specific DOE program as directed by Executive Order 12512, Federal Real Property Management, through analysis required under DOE Orders 4320.1B, Site Development Planning and DOE Order 430.1, Life-Cycle Asset Management. The site manager determines whether the real property is temporarily or permanently not needed. The property is then screened to see if it might meet the needs of other DOE programs. If there are no DOE programs that can use the property, the site manager reports the property to the Office of Management and Administration (MA) at DOE Headquarters or the appropriate DOE Field Office. The appropriate Program Secretarial Officer or designee makes a determination that a real property is excess by preparing the following for MA or the appropriate Field Office:

- Memorandum stating that the real property is excess.

- GSA Standard Form (SF) 118, "Report of Excess Real Property," and any appropriate supplementary forms.

- Recommendation for disposal of the property from DOE accountability.

The memorandum stating that the property is excess must receive all appropriate field element concurrences. The Attachment to SF 118 must address 13 items required by the FPMR. Some of these items include a description of the real property, any restriction on the property, floodplains, wetlands, historic significance, and hazardous materials or waste. Concurrent with addressing the 13 items in SF 118, the field element must identify that portion of the real property on which no hazardous substances or petroleum products were stored for one year or more, released, or disposed in order to meet requirements of the Community Environmental Response Facilitation Act of 1992 (CERFA). The results of this identification must be submitted for concurrence by EPA if the real property is a site on the National Priorities List or by a state official if the property is not on the National Priorities List. If DOE is transferring the property under Section 161(g) of the Atomic Energy Act, DOE does not have to involve GSA in the transfer process or prepare GSA Standard Form 118. However, in practice, DOE essentially collects and discloses similar information for real property transferred under Section 161(g) in terms of identifying hazardous materials and wastes, other environmental considerations, and property future use restrictions.

MA or the appropriate Field Office screens the property identified for transfer with respect to potential needs of the other DOE field elements, program offices and operations offices for the property. The property is declared excess to DOE if there is no permanent need for the property within DOE. Upon approving the property disposal action, the Team Leader of the DOE Real

Property Team within MA or the appropriate Field Office transmits the completed GSA Standard Form 118 to the appropriate GSA regional office and a copy to the DOE field element. DOE Headquarters' approval for reporting of excess real property is generally required for large properties or for field elements lacking a certified realty specialist. If DOE Headquarters approval is not required, the DOE field element then reports the real property to GSA for disposal, and submits the required GSA Standard Form 118 and any appropriate supplementary forms. For property transferred by DOE under the Section 161(g) of the Atomic Energy Act, DOE headquarters and field elements in practice follow the internal DOE processes and procedures described above, but without the involvement of the GSA.

Steps for Withdrawn Land. If the excess real property is withdrawn land, DOE must notify the appropriate BLM office that it intends to relinquish the property for return to the public domain, and prepare a Notice of Intent to Relinquish. DOE must also send a copy of the Notice to the appropriate GSA regional office. There is no specific standard format for the Notice of Intention to Relinquish, however, the it must contain 13 specific items identified by regulation, including:

- The extent to which the land is contaminated and the nature of the contamination.

- The extent to which the land has been decontaminated or the measures being taken to protect the public from the contamination.

- The extent to which the land and resources have been disturbed and the measures being taken to recondition the property.

In addition, DOE must describe easements or other rights and privileges burdened on the land and a list of the terms and conditions, if any, DOE deems necessary to be incorporated in any further disposition of the land in order to protect the public interest. BLM then reviews the Notice of Intention to Relinquish to determine the suitability of returning the property to the public domain. The five conditions for BLM acceptance of withdrawn land for return to the public domain, as identified in 43 CFR 2374.2, are as follows:

1. The lands have been decontaminated and restored to suitable conditions. If decontamination and restoration are uneconomical, DOE must install and maintain protective notices and barriers.

2. DOE agrees to undertake treatment measures and measures deemed necessary by BLM to prevent deterioration of the land and resources.

3. DOE has exhausted GSA procedures for disposition of improvements to the land and certifies they are of no value.

4. DOE has resolved, through a final grant or denial, all commitments to third parties relative to rights and privileges related to the land.

5. DOE has submitted to the appropriate BLM office a copy of the easements, leases, or other encumbrances.

If the property meets all of the five conditions, BLM will notify DOE and GSA that it accepts accountability and responsibility for the excess withdrawn land. BLM then manages the land. If BLM determines that the excess withdrawn land has been so substantially changed in character that it is not suitable for return to the public domain, BLM will notify GSA and request GSA to concur in the determination. BLM tends to reject for return to public domain excess withdrawn land upon which improvements have been built.

GSA Reviews. GSA reviews the submission from DOE to ensure that the documentation is complete and that the real property has no encumbrances and has a marketable title. If GSA rejects the property that DOE has reported as excess, it becomes a candidate for transfer to DOE's Office of Environmental Management (EM). GSA generally rejects real property if it is contaminated. If GSA accepts the property, then DOE can relinquish the property to GSA for disposal. Until the property is disposed, the DOE field element has environmental, safety, and health responsibility for the property for five fiscal quarters from GSA's acceptance of the report of excess property, or until the excess property is disposed, whichever is earlier.

CERCLA Requirements. CERCLA requires DOE to disclose whether any hazardous substances, certain hazardous wastes, or petroleum products have been stored, released, or disposed of on the property, in accordance with CERCLA Section 120(h)(1) and (3) and EPA regulations at 40 CFR Part 373. Conversely, CERCLA Section 120(h)(4) requires DOE to identify uncontaminated parcels of land that are proposed for transfer. EPA or the state agency must approve DOE's identification of uncontaminated parcels. CERCLA Section 120(h)(5) requires notification of the leasing of DOE real property which has been contaminated and where government operations will cease.

CERCLA Section 120(h)(3)(A) requires that a federal agency transferring real property to a nonfederal entity include a covenant in the deed of transfer warranting that all remedial action necessary to protect human health and the environment has been taken prior to the date of transfer with respect to any hazardous substances remaining on the property. In addition, CERCLA Section 120(h)(B) requires, under certain circumstances, that a federal agency demonstrate to EPA that the cleanup remedy implemented on the property is "operating properly and successfully" before the federal agency can provide the "all remedial action has been taken" covenant to the nonfederal entity to which the land will be transferred. Under CERCLA Section 120(h)(C), the covenant can be deferred so that property may be transferred before all necessary remedial actions have been taken if regulators agree that the property is suitable for the intended use and the intended use is consistent with protection of human health and the environment. EPA has issued Interim Final Guidance on Institutional Controls and Transfer of Real Property under CERCLA Section 120(h)(3)(A), (B) or (C). Depending upon whether the property is or is not listed on the NPL, either EPA or the state must approve transfer of property under CERCLA.

For the purpose of spurring economic development in communities where federal facilities are closing, Congress has enacted several statutes to facilitate the transfer of contaminated properties from the federal government. These statutes are aimed at avoiding delays in clean-up and indemnifying new owners from having to clean-up hazardous substances attributable to federal activities. The statutes include CERFA, which amended CERCLA in 1992, and specific to DOE, the National Defense Authorization Act for Fiscal Year 1998 (see page G-3).

Appendix H Long-term Stewardship Points of Contact

This Appendix lists the current principal Working Group Members and the areas they represent. The list will be updated periodically on the long-term stewardship information center web page (***http//lts.apps.em.doe.gov***).

DOE Headquarters Offices

Office	Name	Phone, Fax, Email
Office of Environmental Management	James Werner	202-586-9280 (phone) 202-586-1241 (fax) james.werner@em.doe.gov
	Steven Livingstone	202-586-9874 (phone) 202-586-7365 (fax) steven.livingstone@em.doe.gov
Office of Environment, Safety, and Health	Andrew Wallow	202-586-4996 (phone) 202-586-3915 (fax) Andrew.Wallo@hq.doe.gov
Office of Science	Arnold Edelman	301-903-5145 (phone) 301-903-7047 (fax) Arnold.edelman@science.doe.gov
Office of Management and Administration	Andrew Duran	202-586-4548 (phone) 202-586-9440 (fax) Andrew.Duran@hq.doe.gov
Office of Defense Programs	John Marchetti	301-903-3487 (phone) 301-903-1562 (fax) John.marchetti@dp.doe.gov

DOE Field Offices

Office	Name	Phone, Fax, Email
Albuquerque Operations Office	Deborah Griswold	505-845-4752 (phone) 505-845-4239 (fax) dcouchman-griswold@doeal.gov
Chicago Operations Office	Susan Heston	630-252-2381 (phone) 630-252-2654 (fax) Susan.heston@ch.doe.gov
National Energy Technology Laboratory	Celinda H. Crawford	304-285-4128 (phone) 304-285-4403 (fax) Celinda.Crawford@netl.doe.gov
Idaho Operations Office	Patty Natoni	208-526-1292 (phone) 208-526-0603 (fax) plw@inel.gov
Nevada Operations Office	Bobbie K. McClure	702-295-1862 (phone) 702-295-1113 (fax) McClure@nv.doe.gov
Oakland Operations Office	Laurence B. McEwen	510-637-1623 (phone) 510-637-2031 (fax) laurence.mcewen@oak.doe.gov
Oak Ridge Operations Office	Ralph Skinner, Jr.	423-576-7403 (phone) 423-576-5333 (fax) skinnerrm@oro.doe.gov
Ohio Field Office	Susan L. Smiley	937-865-3987 (phone) 937-865-4402 (fax) sue.smiley@ohio.doe.gov
Ohio - Fernald Environmental Management Project	Kathi Nickel	513-648-3166 (phone) 513-648-3076 (fax) kathi.nickel@fernald.gov
Richland Operations Office	Jim Dailey	509-376-7721 (phone) 509-372-2610 (fax) James_L_II_Daily@rl.gov
Rocky Flats Field Office	Thomas E. Lukow	303-966-4561 (phone) 303-966-2994 (fax) Tom.Lukow@rfets.gov
Savannah River Operations Office	Donald E. Scott	803-725-1548 (phone) 803-725-2016 (fax) Donald.Scott@srs.gov
Weldon Spring Site Remedial Action Project	Thomas Pauling	314-441-8978 (phone) 314-447-0739 (fax) thomas_pauling@wssrap-host.wssrap.com

Appendix I List of Contributors

[to be completed]